Table of Contents.

East Boston Dock Conflagration, ... Frontispiece.

Cotton Seed Products, *W. D. Grier*, ... 147

Fibreboard and Leatherboard Factories, *W. P. Tenney*, ... 156

Editorials, ... 160

Secretary's Report, Branch Offices and Underwriters Laboratories.

- Secretary's Notes, ... 172
- List of New Members, ... 173
- Approved Devices and Materials, ... 175

Committee Reports, ... 193

- Executive Committee; Committee on Devices and Materials; Hose; Pipe; Standard Hose Coupling and Hydrant Fittings for Public Fire Service; Theatre Construction and Equipment.

Paint and Varnish Factories—Fire Record, ... 199

General Fire Record,

- Unsatisfactory Sprinkler Fires, ... 215
- Large Loss Sprinkler Fires, ... 232
- Special Sprinkler Fires, ... 235
- East Boston Dock Conflagration, ... 238
- Chelsea Conflagration (Second or Smaller Fire), ... 245
- New Orleans Conflagration, ... 247
- Miscellaneous Fires, ... 257

Notes and Tables.

- Cleveland's City Ordinance Prohibiting the Sale or Use of Fireworks, ... 261
- Handling of Live Wires and Fire Streams, ... 262
- Chlorate Explosions, ... 265

Reports on fires appearing in the Quarterly are copies of or extracts from written reports forwarded to the Association. This Association, as a body, is not responsible for the statements or opinions of any of its members.

East Boston Dock Conflagration.
Destruction of Grain Elevator. Page 238.

Cotton Seed Products.

Prior to the year 1870, practically all of the cotton seed produced in the United States which was not needed for planting was regarded as a waste product, and its disposition was quite a problem for the ginners. It was carted away and destroyed, or in some cases used as a low grade fertilizer. The fact that a marketable oil could be extracted from the seed was known, however, and it is said that several oil mills were built prior to 1840. In 1867 there were said to be four in operation, but the industry did not reach commercial importance until 1870. The oldest mill with which the writer is acquainted is the plant of the Alabama Cotton Oil Co., at Selma, Ala., which is said to have been built in 1873.

Prior to 1870 Great Britain was the chief cotton oil producer, having an annual crush of 200,000 pounds. In 1907 there were 786 cotton seed oil mills in operation in the United States. In 1907 the aggregate value of the cotton crop in the United States was $700,956,011, of which $87,325,575 was represented by cotton seed—practically 12 per cent. The total crush in the United States for 1907 was 2,564,873 tons.

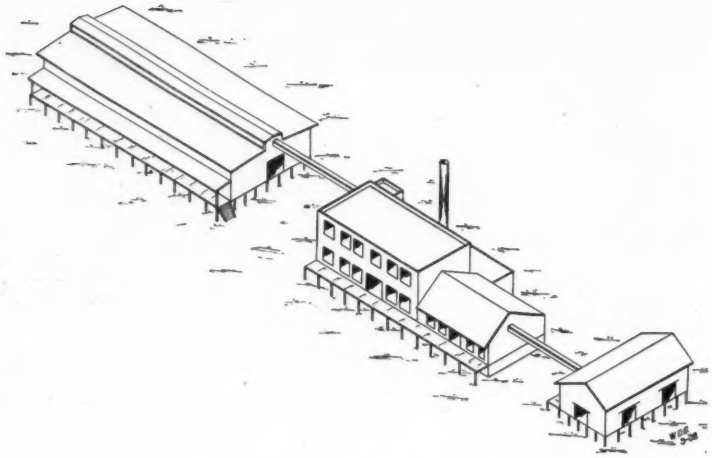
With the revival of industry in the South after the Civil War, it was found that cotton seed instead of being a troublesome by-product which was difficult to dispose of was an article of great value which could be almost entirely utilized, there being little or no waste from the oil mills, with the exception of what trash and dirt was screened from the seed. Cotton seed, being a bulky product, prone to heat and to deteriorate in transit, it is natural that the greatest development of the business is found where the seed is grown, namely, in the southern and southwestern states, where it constitutes one of the leading industries.

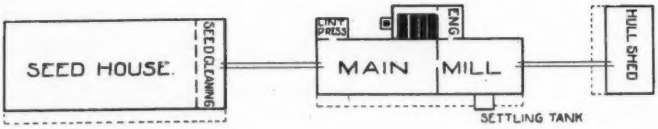
RAW MATERIAL.

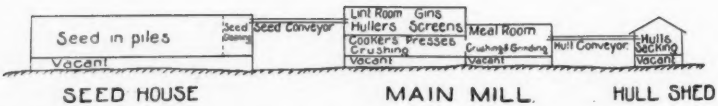
About the only raw material found in a cotton seed oil mill is the cotton seed itself, which is received in bulk from neighboring ginneries and stored in piles in the seed houses, as described later on. The seed of the cotton plant is a small, black seed, about three eighths of an inch long, consisting of an oily kernel or meat covered by a hull, to which adheres more or less short fibre or lint, which remains after the first ginning, during which the lint cotton is removed. The seed as received at the mill contains more or less trash and dirt, such as sand, small stones, twigs, bolls, etc.

PROCESSES.

There are few businesses in which the construction and arrangement of the plant has become more typical or specialized than in the cotton seed oil industry. The general arrangement and construction







View, Plan and Section, Typical Cotton Seed Oil Mill.

of the mills is very much alike, the difference being mainly due to changes made necessary by the available building site, location of the railroad, or other local conditions. The main mill is frequently brick—more rarely frame—that portion occupied for the re-ginning being usually two stories in height—the balance one story. In the newer mills the floors and roof are quite frequently of plank and timber construction, with wide bays, and in the older ones are usually the ordinary narrow joisted type. The mill proper is usually divided into several sections by brick walls, the separate sections being occupied as de-linting or re-ginning rooms on the second floor, hulling, crushing, pressing, meal grinding, etc., on the first floor, as shown in the accompanying sketch. Adjacent to the main mill, usually from 10 to 50 feet distant, are the seed and hull houses, which may be one or more in number, some large mills having two or more seed houses. The seed houses are very large, the buildings sometimes 150 or 200 feet in length and 50 to 100 feet in width, consisting of one high story, usually of heavy frame construction, with a plank floor raised on posts, leaving an open space of some four feet in height beneath. The seed houses communicate with the mill by wooden troughs carrying the conveyors which handle the seed. The hull house is usually of similar construction to the seed houses but smaller, and is generally placed some distance from the main plant. Large cotton oil mills sometimes have appurtenant to the plant a ginnery of the usual construction, which is generally detached 50 or 100 feet, and sometimes a fertilizer shed where cotton seed meal is mixed with potash salts and the like, for use as a fertilizer. Most mills have within the mill yard a detached office building or superintendent's dwelling, mule stables, and one or more frame sheds used for the storage of baled lint, grabots, and miscellaneous purposes. The first process is the cleaning of the seed. This is usually effected in one of the seed houses, one end of the building being partitioned off for this purpose, generally by a wooden partition. The seed which is delivered from wagons is dumped into the hoppers of bucket conveyors and raised to the top of the seed house, where it is handled by screw conveyors and dumped in large piles, from 10 to 20 or 30 feet high, on the floor of the seed house. It is shovelled from these piles into the trough of a screw conveyor which is placed generally running down the middle of the seed house on the floor. It is thus conveyed to a bucket elevator and raised again to the top of the seed house, where it is delivered by gravity to the cleaning machinery. The cleaning machinery consists essentially of two sets of screens or reels, the first being known as the "sand screen" where sand and loose trash is removed, and then through the boll screen where the empty bolls are shaken out, the bolls thus removed being known as "grabots." The more or less clean seed then passes through an overhead screw conveyor to the lint room which is almost always on the second story of the mill, and here it is re-ginned to remove the short fibre or lint adhering to the seed. The gins used are very much like the ordinary saw gins used for removing the long fibre from the seed, and may be anywhere from 10 to 20—sometimes more—in number. The gins are always set in a row on an elevated platform,

leaving a space beneath for the purpose of sweeping out the lint and dirt which accumulates very rapidly. Before passing between the saws, the seed passes over the electro magnets which are quite frequently energized by the lighting current of the mill. The lint is removed from the saws, which revolve at about 300 revolutions per minute, by brushes and passes to the rear of the gin where it is rolled up into a bat or loose roll weighing, perhaps, 12 pounds, which is usually removed to the lint press room as soon as formed. The seed, divested of its lint, passes from the gins to the hullers, which consist of a set of knives which revolve within a set of fixed knives, the space between being sufficient to allow the seed to pass without crushing, the hull being removed by the shearing action of the knives. The hullers are frequently in the same room as the gins. From the hullers the meats and hulls are conveyed to a set of shakers or screens where they are separated, the hulls passing to the hull house where they are bagged and sold as a low grade cattle food. The meats pass through a set of crushing rolls where they are crushed to a very coarse meal, without extracting any of the oil. In order to properly extract the oil it is necessary that the meats should be cooked, and to this end the crushed kernels are delivered to a set of cookers which consist of steel receptacles surrounded by steam jackets well covered with asbestos or other non-conducting material to economize heat, and raised above the floor on metal pillars. In these cookers, which are always on the first floor of the mill, the seed is cooked for approximately half an hour, at a temperature of about 200 degrees F. The cooked meal is then delivered to a former where it is deposited on a press cloth made of camel's hair, which is laid on the bottom of a forming pan. The ends of the cloth are turned over the cake and enough pressure applied to form a loosely adherent cake, which is then removed to the press where the oil is extracted. These presses are the ordinary type of box press operated by hydraulic pressure, and as soon as all the boxes are filled with meal, a pressure of several tons is applied, and the oil runs out into collecting troughs at the base of the presses. From these troughs it passes to settling tanks in the lower part of the mill from whence it overflows to other tanks, from which it is pumped to the storage tanks. The storage tanks are nearly always situated at some distance from the mill proper, and consist of one or more large steel tanks of several thousand gallons capacity, placed above ground, and in the larger mills are quite frequently housed over by a light roof raised on posts, without any sides. The tanks are usually placed at this distance from the mill, not on account of any hazard with respect to the oil, but to get advantage of a low insurance rate by eliminating the exposure of the mill to the tanks. The lint removed from the seed is taken to the lint baling room as described above. This room is usually on the second floor of a two-story extension to the main mill, the first floor being occupied by the lower part of the baling press. The lint is baled up and usually removed to the storehouse, whence it is shipped for use wherever a low grade, short cotton fibre may be used, such as in the manufacture of quilts, some kinds of absorbent cotton, shoddy mixtures, mattress tops, carpet lining, etc. The press

cake which is removed from the oil presses in hard slabs, entirely free from any oil, is broken up in a cracking mill to which it is conveyed by hand, the broken lumps being afterward ground into a meal which forms a valuable cattle food and fertilizer.

The processes as described above are carried on in practically the same way in all mills, the only difference being sometimes a little different arrangement of the machinery caused by local conditions. In connection with the regular processes of manufacture there is usually an automatic saw filing machine placed in or near the gin room where the gin saws are automatically sharpened as required. Minor repairs, machine work, pipe fitting, etc., are usually carried on as needed, in a small shop detached or adjoining the engine room. In some mills the press cloths are washed and dried, and in others are in continuous use.

The above description covers everything incident to the production of crude cotton oil. Before the oil can be used it must be refined, and this refining generally constitutes a separate business, and while some of the larger oil mills have refineries adjacent and operated in connection with the mill proper, many of the smaller ones ship their crude oil to be refined elsewhere. The refining process is not very complex, and does not present many hazards. Refineries are usually three stories high, of brick or frame construction, with plank and timber, or sometimes joisted floors, and in one or two cases which the writer has seen the floors are practically iron platforms surrounding the refining tanks placed at different levels. The refining consists essentially of successive treatments with caustic soda and water in steam-heated kettles or tanks provided with agitators, settling out the "foots" or soap stock, and drawing off the refined oil. This is filtered through cloths in filter presses, and in order to make white oil is mixed with ground fuller's earth, which is afterwards removed by filtration in presses. The making of white oil in some mills is a "secret" process which is jealously guarded. The refined oil is barreled and shipped away and the "foots" sold, or in some cases utilized on the premises as soap stock. In connection with refineries there is usually more or less re-coopering of barrel stock and painting of barrels. The paint is usually mixed with benzine, this process being carried on in a building detached considerably from the main plant. Some refineries have in connection therewith soap factories where the soap stock is manufactured into soap in the usual way, and some have a compound lard factory appurtenant, where the refined oil is mixed with tallow, etc., to make a "lard compound."

HAZARDS.

The hazards of the cotton oil mill are not many, and are well marked and generally thoroughly understood by the operators. The bulk of the employees is usually a low grade of negro help, the superintendents and foremen being white men. There does not seem to be anything about the business which requires skilled labor, with the exception of the foremen, superintendents and engineers. The chief

hazard in the mill proper is undoubtedly in the lint room, where the hazards of hot bearings, foreign matter passing through the gins, and flash fires are always present. In most mills considerable care as to sweeping down is exercised, and there is not usually any great accumulation of loose stock in the room, so that a flash in a gin is not necessarily productive of a serious fire. The hazards of hulling, grinding, cooking, pressing, etc., are not serious, being confined to those incident to any process where moving machinery, hot steam pipes, and more or less grease and oil are involved.

In the seed house the hazards are considerable, not only from the tendency of the seed to heat and take fire spontaneously, but in a greater degree from hot bearings around the conveyors and cleaning machinery. The bearings of the conveyors are nearly always in more or less inaccessible locations, peculiarly subject to clogging and obstruction from lint and dirt of all kinds, and have undoubtedly been productive of numerous fires, as has the cleaning machinery. The hazard in the hull house is considerable, the hulls being apparently prone to spontaneous combustion, and there have been numerous fires in hull houses, the contents being usually a total loss, the hulls being practically valueless after being wet. In a recent fire in a hull house it was found that the damaged and water-soaked hulls were hardly worth the expense of handling even as fuel. The grabot screened out of the seeds is sometimes re-ginned in the seed cleaning house, thus constituting a serious hazard. The bolls and trash resulting from the various screenings are usually burned in the boilers and not allowed to accumulate in any great quantity.

To summarize, in the writer's personal opinion, the chief hazards in a cotton seed oil mill proper are the ever present ones of dirt, untidiness and, in a lesser degree, hot bearings, steam pipes improperly arranged, and the like. In cotton seed oil refineries the special hazard is not as great as might be imagined, the most serious being that from the press cloths, which should be immediately washed and dried and not allowed to lie about, and the fuller's earth from the filter presses, which if dumped out in a pile is almost certain to be shortly raised to a glowing heat by the oxidation of the oil remaining on the finely divided particles of fuller's earth. This hazard is well recognized by all oil refiners with whom the writer has talked, and special efforts are usually made to remove the fuller's earth to a safe distance, it being usually dumped on the ground some little distance from the building.

PROPERTIES AND USES OF COTTON SEED OIL.

The use of cotton seed oil was undoubtedly known to the Chinese centuries before cotton was ever cultivated in America. They had crude methods of pressing it from the seed, using it for illuminating purposes, as a lubricant, and edible oil. Its chief use at the present time is as a substitute for olive oil and in the manufacture of lard compound, oleomargarine and soap. The oil itself is a clear fluid, varying from brownish to almost white, according to the degree of

refinement, and having a pleasant nut-like flavor. It has no injurious qualities when used as a food product, and is probably quite as good as olive oil. It is not to be classed as an inflammable oil, having a high flash point, although like other oils it burns freely when once ignited. Like linseed oil, it is oxidizable, although not as readily as linseed oil, and while undergoing oxidation it heats more or less—probably rags or rubbish saturated with cotton oil are quite as prone to spontaneous combustion as they would be if saturated with any other oil except linseed oil which possesses this quality to a very great extent. The economic value of cotton seed can be readily appreciated from the following data. These figures it must be understood are approximate, as the market prices vary from day to day, but will serve to give some general data on this point.

One thousand five hundred pounds of seed cotton contain approximately 500 pounds of lint cotton, 980 pounds of seed, and 20 pounds of trash. A ton of seed worth approximately $12 at the mill yields about 40 gallons of crude oil, worth from 30 to 40 cents per gallon, about 50 pounds of linters worth from two to four cents a pound, about 813 pounds of meal worth $22 a ton, and about 725 pounds of hulls worth from $6 to $7 a ton.

The table following shows the product of the cotton plant and cotton seed. One fact to be borne in mind is that cotton seed oil mills run for only a few months in the year, starting up in the fall as soon as the cotton crop is picked and shutting down in the late winter or spring as soon as the seed is crushed.

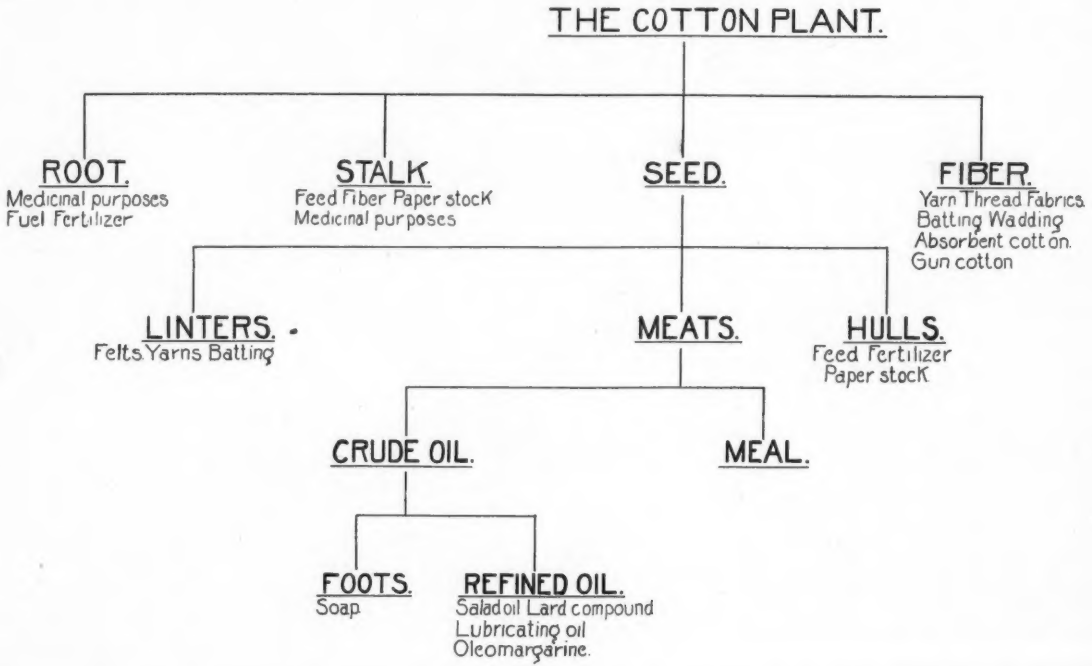
PROTECTION OF MILLS IN GENERAL.

Cotton oil mills should be preferably built of brick, with noncombustible floors and roofs, without a basement, and any open space beneath the buildings enclosed, so as to preclude the accumulation of rubbish therein.

The various processes of the mill proper should be separated by good, brick, cut-off walls, with standard automatic tin-clad doors at all openings. The seed and hull houses should be well detached so as not to expose the main mill, and should be divided into sections by good, brick, cut-off walls, with special protection at openings for elevators, conveyor troughs, etc., as the value in the seed houses sometimes runs high when filled. Where the seed or hull houses are placed in dangerous proximity to the main mill, all exposed windows in the latter should be wired glass in standard metal sash.

The cleaning machinery should be well cut off from the rest of the seed cleaning house. Undoubtedly the most efficient protection for cotton oil mills (in common with any other buildings) is a standard two-supply sprinkler equipment, and many mills are so protected. In installing such an equipment, while it is not usual to equip the seed house proper, the room containing the cleaning machinery should most certainly be equipped. Special care should be taken in providing sprinklers beneath the gin stands and over the roll of lint or bat at the rear. In most cases it will be necessary to have the entire equip-

USES OF THE COTTON PLANT.



ment on a dry system, as in a great many mills it is necessary to shut water off and drain the system to prevent freezing at the time when the protection is most needed, namely in the winter when the mills are running, sometimes night and day. As these mills are usually on the outskirts of town, remote from fire protection, or in some small town where the fire protection is weak, particular care should be paid to the question of yard hydrants, which should be supplied by National Standard pumps of ample size, with good water supplies. The plants should always be under the care of competent, white, watchmen, at all times when not running, all rounds to be recorded on approved watchman's time recording device.

WM. D. GRIER, *General Inspector,*
North British & Mercantile Insurance Company.

Fibreboard and Leatherboard Factories. Processes and Hazards.

The general use of leather in arts and manufactures during the last 50 years and its continuous advance in price, led to the introduction about 1860 of so-called fibreboard or leatherboard. Both terms were at one time used synonymously, meaning any board made of fibre, the word fibreboard referring particularly to the materials out of which it is made, while the term leatherboard had reference to its applications and appearance. Within the last 10 years the word leatherboard has been used to designate a true leatherboard, that is one made from leather scrap and paper stock which is much in demand for shoe factory work. It is much softer than fibreboard and is easier to work, though the wearing qualities are not so good. The real fibreboard is a hard, compact board of considerable flexibility and good wearing quality made from some waste vegetable fibre.

The general trend of processes is the same as for the manufacture of paper and cardboard, but the same care is not necessary to turn out a salable product.

RAW STOCK.

To mention a complete list of the waste fibres entering into the manufacture of fibre and leatherboard would be almost impossible. Anything which has a fibre of sufficient strength is used, such as cotton rags, flax, hemp, old rope and twine, tow, jute, bagging, burlap, paper stock, wood pulp, pulp screenings, cotton mill sweepings, leather skivings and leather scrap. These are purchased in bales and kept in storehouses near the factory until needed. The storehouses are light, one-story frame sheds usually open to the weather. The stock is of such a character as to discourage cleanliness and it is no exception to find these storage sheds looking more like junk shops than regular storage buildings.

CUTTING.

Preparing this miscellaneous stock is the first process,* it being necessary to reduce the raw stock to small fragments in order that it may be quickly separated into its original fibres by future processes. The stock is run through a cutting machine (revolving steel knives) and deposited on an apron which delivers it close to the rotary bleach. This hazard of cutting is most dangerous and a prolific source of fires. The timbers of the room are usually coated with dust and there is often considerable "fly" in the air. Fires start here from some foreign material, such as a match or piece of metal passing through the cutter.

*In leatherboard making the first process is beating. Shredding machines for cutting up the leather scrap are about to be introduced.

Generally speaking the fire does not pass quickly through the room unless the stock is specially inflammable, such as cotton mill sweepings; these fires are of frequent occurrence, though the damage is usually small.

BLEACHING.

As soon as the proper amount of stock has been cut, it is placed in the rotary bleach with lime, soda ash or some alkali. The rotary bleach is a large cylindrical iron boiler arranged to revolve horizontally on its longer axis. It is usually located on the floor below the cutting room, close to the ceiling. Steam is turned on and the boiler allowed to slowly rotate for from 12 to 18 hours. This destroys the natural gums found in some of the stock and also the fatty, glutinous and coloring matter surrounding the fibre. There is but slight hazard, and we have no knowledge of any fires having started from this work. There is a possibility, however, of an explosion of these rotary boilers and serious damage might be done in this case.

BEATING.

The stock then is fed to the beater engines. The beaters are similar to those in paper mills and are designed to thoroughly separate the stock into its original fibre, so that it can finally be floated in water to the board machines. In the beaters it is mixed with coloring matter such as oxide of iron or venetian red if coloring is desired, and also sized with rosin and soap. Alum or weak sulphuric acid is added to set the color. The length of time for this process depends entirely on how closely knit the fibres are. Thus any loose fibre such as flax waste or paper stock, if containing only these substances, takes only a few hours, while leather scrap takes from 10 to 12 hours continuous beating or even longer. Generally the stock used is a combination of many raw stocks and of course varies with the kind of board to be manufactured. There are no hazards to this process.

BOARD MAKING.

The stock now passes to the stuff chests, which are simply storage tanks or enclosures, from which it is pumped to the wet machine. The wet machine or board machine is similar in principle to a paper machine, but has no calenders attached. The finished board is allowed to feed around a cylinder until the proper thickness is acquired when it is removed by the operator. There is no hazard to the process. Sometimes the board heats up slightly when a large amount is piled in a damp condition. This heating is not enough to cause fire, however, but it has to be watched closely or the board is spoiled.

DRYING.

The sheets of leatherboard are obtained in sizes about 40x45 inches or slightly smaller and now have to be dried. There are several

methods of doing this. In pleasant weather during the summer months it is almost invariably dried in the open air. Besides being cheaper this method produces a better fibreboard. Other methods of drying are to place the board on racks in long enclosures about six feet high and ten feet broad, extending the length of the room. These are heated by hot air blown in by fans located at one side of the enclosure or by steam pipes extending throughout the enclosure, either at top or bottom.

Another method of drying is to erect one high dry room with slatted floors at different levels, hang the leatherboard in these rooms and blow hot air from bottom to top of dry room. The boards are also hung by wooden clips from wires stretched across an ordinary room heated by steam. There is also a method of drying which uses iron plates through which circulates steam. The fibreboard is placed on these plates.

The drying processes are more or less hazardous. Especially is this the case where steam of a high pressure is used. If the dryers in a mill are not large or numerous enough to care for the output they are liable to be forced. Steam as high as 80 pounds pressure is often used so as to dry the board quickly. Such dryers are dangerous. Ordinarily not over 10 or 15 pounds steam pressure is employed. It is quite important to keep these enclosures clean, as dust together with small pieces of the fibre collects on the pipes and on the floors. These dry room enclosures built of wood are necessarily very inflammable. Perhaps the greatest danger is just because of this inflammable construction, for ordinary fibreboard will not readily burn. A hot bearing at the fan or the long continued action of steam pipes on wood are quite liable to start fires in the racks or woodwork of these rooms.

FINISHING.

After drying the fibreboard is hard and warped out of shape. It is passed through heavy steel calenders to straighten and polish it. Then it is trimmed to the desired size and is ready for cutting up into counters, inner-soles, shanks or any of the other uses for which it is designed.

HARD FIBRE.

When ordinary fibreboard is treated with sulphuric or hydrochloric acid and zinc, the cellulose of which it is composed undergoes chemical change and a hard fibre product is formed. Hard fibre, variously called leatheroid, horn fibre, dirigo or vulcanized fibre, is as tough as rawhide and nearly as elastic as whalebone. It is much like horn in texture, and wholly impervious to oils and greases. In water it swells and softens becoming soft like rubber, but will not dissolve. It forms a very good insulating material and is used on all kinds of electrical appliances, trunks, sample cases, roving cans, mill baskets, corset bones and phonograph horns. The hazards of making hard fibre are not great and are due principally to the dry rooms where the fibre is dried.

WATERPROOFING.

Much of the leather and fibreboard, particularly that which goes into counters, inner-soles, box toes and the interior lifts of heels, is waterproofed. The waterproofing is done in various ways. Some manufacturers soak the fibreboard in paraffine oil or in a rosin and naphtha solution, while others incorporate heavy grease into the body of the board when it is in the beaters. They then treat the finished board with melted paraffine. As a general thing the waterproofing process when naphtha is used is very dangerous because of the well-known properties of naphtha and the impossibility of exercising careful supervision over the workmen. Again, the resulting fibreboard is more inflammable, especially is this the case where the grease is mixed with the fibreboard in the beaters. Some fibreboard made in this way is easily set on fire, burns like a slow match and is hard to extinguish.

All waterproofing where naphtha is used in any form should be done in a detached building and care should be taken to prevent open lights from coming in contact with naphtha fumes. All free naphtha should be stored underground and pumped to a detached building for mixing.

CONCLUSIONS.

The similarity of fibreboard processes to those of paper mills, the low basements with inaccessible shafting and the general uncleanliness usually noted, leads one to expect a fire record rather worse than with paper mills. If this does not prove to be the case, it does not mean that the dangers of burning are any less than the paper mill class, but rather that our experience has not been long enough nor the number of fibreboard factories sufficiently great to obtain a proper average. Ordinary fibreboard (not waterproofed) does not burn readily, to which fact may partly be due the freedom of these mills from fires. Since 1880 we have six recorded fires in fibreboard factories. Two in the cutting room; one in the dryers; one from waste stored on the premises, and one in the naphtha waterproofing building. This practical experience well agrees with theory which places the danger points in fibreboard mills as the cutting rooms, the dryers, the waste stock and storage sheds and the waterproofing with naphtha, to which might be added the danger from hot bearings due to the improper care of shafting.

A form of waterproof leatherboard known as Hide-Ite has had rather a bad fire record and is now being carefully investigated. The manufacturers are endeavoring to make changes in the processes of manufacture that will lessen the fire hazard. A report will be made on this in the near future.

W. P. TENNEY, *Inspector.*
The Underwriters' Bureau of New England.

Editorials.

It is with sorrow and a feeling of personal loss that we record the death of Mr. Alfred Stone, of Providence, R. I. Mr. Stone was a member of our Executive Committee and the representative of the American Institute of Architects at our Annual Meetings. He was also Chairman of the Committee on Automobile Garages and a member of the Conference Committee on the Building Code.

Mr. Stone was one of the oldest and best known residents of Providence, R. I., where he had lived for more than forty years. He was born in East Machias, Me., in 1834. By profession, an architect, he was identified with many of the public improvements of Providence and with his partners planned and executed a number of prominent buildings, including the State Prison, the Providence County Court House, Providence Public Library, the Young Men's Christian Association, also many schools, hospitals, college buildings and business blocks.

From 1893 to 1899 he was secretary of the American Institute of Architects and has always been prominent in their affairs.

Mr. Stone was a man of most pleasing personality, kindly disposition, and lovable nature, and while well along in years according to the world's reckoning, his mind and heart were young, and in our meetings and conferences he was always one of us, active in mentality, happy in disposition. We looked up to him as a man of ripe experience and excellent judgment. Especially in those subjects with which he was closely identified on account of his profession, he was a leader in our Association work, and we who have been fortunate in knowing him will long remember him as a personal friend and a most valuable co-worker.

The American Society of Mechanical Engineers have extended to our members an invitation to attend any of their meetings in New York City. These meetings are held in the Engineering Societies Building and they will be glad to welcome any of our members who may find it convenient to attend.

The enormous waste due to loss of property by fire still continues, and regardless of the many improvements being made in construction and protection we find the average daily or monthly loss increasing rather than diminishing. This can but spur us on to greater endeavors to diminish the fire loss.

Publicity is essential. Until people realize the importance of this problem, they will not as a whole take the necessary steps to solve it. It is of comparatively little use to point out the way if people either do not care or are unwilling to follow. To place the needs of the age forcibly before the public means sacrifice of time and the ex-

penditure of considerable labor on the part of those qualified to teach, and those of our members who are attempting to do their part in this work are certainly deserving of the thanks of our Association and the public whom they are endeavoring to aid.

We will quote freely from several articles which have appeared in the press during the last quarter in order to show the good work being done and also because we feel that the subject matter itself cannot but be of general interest to our members.

The following editorial on **"The National Fire Loss"** appeared in the Boston Sunday Herald of August 23, 1908.

Ample justification for the work of the National Fire Protection Association is offered in the statistics furnished by Mr. C. M. Goddard on another page of today's Herald. What is unexplainable is that the people should require any prodding to action necessary to check the loss. The average destruction by fire in the United States for each of the last five years was more than a quarter of a billion. Fifty per cent. of the fires are due to preventable causes. Laws properly enforced will constitute efficient preventives. But a campaign of education is needed to sustain these laws with public sentiment and to correct the individual carelessness and recklessness which is an American characteristic. Even the lesson of experience appears to need exposition and application to be appreciated and heeded.

The article referred to was written by President Goddard and called attention to the enormous annual loss by fire which for the last five years has averaged over $250,000,000. The article begins as follows:

Many years ago it was written of a type of man who was only concerned with the present, that, after gathering his worldly possessions into his barn, he said to himself, "Take thine ease, eat, drink and be merry."

The Boston Herald a short time since, in commenting editorially on the Collinwood school disaster, said: "We are the most careless people on earth—we permit a looseness of conditions, a recklessness of method, or a method of recklessness, which would not be tolerated in Great Britain, Germany or France."

It seems to me that there is a striking similarity in the attitude of the old-time character and that of the modern character as described by The Herald.

In availing myself of the opportunity offered by The Herald to give to its readers the reasons that led up to the formation of the National Fire Protection Association, and what it is striving to accomplish, it has seemed to me that no more apt texts could be found than the above quotations; and while this is not to be a sermon, still I may be allowed a text for an article in a Sunday paper.

Until quite recently any organized effort to reduce the fire loss in this country was confined to the representatives of the underwriting or insurance interests, and, therefore, in giving a history of the early days of fire protection engineering, it will be necessary to speak largely of the work of insurance societies, although we are glad to say that other societies are now realizing the importance of this subject, so that the National Fire Protection Association, although started as an insurance association, counts among its members such associations as the American Institute of Architects, American Institute of Electrical Engineers, American Society of Heating and Ventilating Engineers; American Water Works Association; International Association of Fire Engineers; National Electric Light Association and others, and is carrying on its work in the broadest way through these associations, working with the insurance companies, but for the good of the public.

It has only been within the last 30 years that the insurance companies have given any great amount of attention to scientific efforts to reduce permanently the fire loss; up to that time they had been accustomed to take things as they found them, and make their charges accordingly.

The ever increasing loss ratio, and the consequent necessity of increase in rates, which always resulted in criticism and frequently in ill-advised legislative action, together with the advent of more modern business methods brought into existence an effort to, in some way, reduce the yearly fire waste, and this effort eventually produced a class of men in the employ of the insurance companies who have become known as fire protection and prevention engineers, men who have made a life study of the details of building construction, location and protection, to the end that the causes of fires may be reduced to a minimum.

When the use of electricity for light and power was first introduced—a little over 25 years ago—it soon became evident to the insurance interests that it might be a prolific cause of fires, and the various boards of underwriters began to frame rules for the different localities under their special jurisdiction. The result was a great variety of requirements differing in different places, so that work which was acceptable in Boston was condemned in New York, or elsewhere, and vice versa.

At my suggestion in 1892, the various electrical engineers in the employ of the insurance companies met in New York and formed the Underwriters' National Electrical Association, with the result that five years later, the "National Electrical Code," endorsed not only by all the insurance companies, both stock and mutual, but also by the various national associations interested in electrical matters, was issued as the sole code of rules for electrical installations for light, heat and power throughout the United States; and this code is today used by practically all municipal inspection departments as well, and has been largely adopted in Canada. It is believed that the fire hazard of electricity has been largely eliminated by the requirements of this code, although, of course, as in other lines of business, poor, cheap work is still put in, and constant inspection is required to keep work up to a safe standard.

Encouraged by what has been accomplished in the lines of electrical engineering, it seemed worth while to make similar attempts in other lines of fire protection, and in 1896, the National Fire Protection Association was organized by a few individuals, at a meeting in New York City, its membership at first being confined to representatives of insurance associations, but later broadened out to include all national associations "interested in the protection of life and property against loss by fire."

Its membership today includes 63 such associations, and in addition 1,278 individuals as associate and subscribing members. The articles of association state that "the objects of this association shall be to promote the science and improve the methods of fire protection and prevention; to obtain and circulate information on these subjects and to secure the co-operation of its members in establishing proper safeguards against loss of life and property by fire."

He continues with numerous statistics showing the increase of the fire loss and compares it with the very small loss in other countries. For instance, the annual per capita loss in Italy is twelve cents, in Germany forty-nine cents, with Australia, Denmark, France and Switzerland in between. In the United States the loss is $2.47 per capita. Berlin has a population of 3,000,000, and its average annual fire loss is $150,000. Chicago has about 2,000,000 population and an annual fire loss of nearly $5,000,000.

Mr. Goddard calls attention to the lessons taught by recent conflagrations and serious fires and the false economy of cheap construction and poor protection. He ends up with reference to the Underwriters' Laboratories and the work of the National Fire Protection Association as follows:

An outgrowth of the work of fire protection engineering has been the establishment of the Underwriters' Laboratories, at Chicago, an institution possessing undoubtedly the best equipped testing station in the world for this class of work; employing a large corps of competent engineers in the various branches of the work, and with branch offices in 20 or more of the larger cities. Through these Laboratories all sorts of devices from an electric light switch to a fire door, or from a sprinkler head to a 40-gallon chemical engine, may be examined and tested to ascertain if they are in accordance with standard re-

quirements, so that they will introduce no fire hazard, or will serve to extinguish fires as the case may be.

The Laboratories go further in this work by arranging with manufacturers to the end that engineers visit their factories at frequent intervals and so are able to assure themselves that all the output is up to the standard, and this allows the manufacturer to affix to his product what is known as the Underwriters' Laboratories label or stamp, so that when a man buys, say, a chemical extinguisher with the Underwriters' Laboratories label attached, he knows that he is getting a standard and approved article, or, in other words, that he is receiving what he is paying for. The Underwriters' Laboratories work in close touch with the National Fire Protection Association, using their requirements for the standards by which tests are made.

Now, after all has been said, the whole work of the National Fire Protection Association can be summed up as follows:

FIRST: From experience, study and investigation, to be prepared to furnish to the public information as to the best practicable means of reducing hazards which may produce fires, and of extinguishing and preventing the spread of such fires as do occur.

SECOND: Through a campaign of education, to arouse an interest in the unnecessarily tremendous fire loss in this country so that self-interest will cause the public to avail itself of the information above referred to.

It may seem strange, but it is a fact that this second task of the Association is immeasurably the most difficult.

We have prepared and given out the information, but we cannot compel the property owner to make use of this so long as municipal regulations allow him to erect unsafe buildings with inadequate fire protection. From our viewpoint as engineers, it is perfectly practicable to put up safe buildings and to improve and protect those already built and generally at a reasonable expense. If our legislative and municipal authorities would devote their time to enacting laws which would tend to reduce our fire waste, they would, we believe, insure direct financial benefit to their constituents in the way of reducing the cost of insurance and fire departments, as well as the indirect benefit of reducing the destruction of created wealth.

We believe that it is no more than right and proper to require that owners of buildings, which are a hazard to the lives and property of others, should make such improvements as have been shown to be reasonable and effective in eliminating the fire hazard, and until such laws are enacted and are enforced this country will continue to be an example to the world of a woful fire waste, largely due to carelessness and recklessness.

Gorham Dana, Manager of The Underwriters' Bureau of New England and Chairman of the Committee on Uniform Requirements, has also written an article for the Boston Sunday Herald entitled **"The $500 per Minute Fire Tax. How to Reduce It. A Few Pointers for the Average Man."**

Every year there is being absolutely wiped out of existence in this country $250,000,000 worth of property. Day and night—even while you are reading this article, the loss goes on at an average rate of $500 per minute. This is really a tax as it is paid for by the public either directly or through insurance premiums. Furthermore, the total tax due to the fire waste including as it does the cost of fire departments, high pressure water systems, protective departments, etc., is more than twice this sum or over $600,000,000 per year.

It is a curious fact that, although the public is much more vitally interested, it is the fire insurance representatives that have done practically all that has been done to improve the situation. The insurance companies can adjust their rates to cover the loss no matter how large it is, but it is the public that really pays the bill.

Surely something should be done to reduce this tax. Something can be done.

President Goddard of the National Fire Protection Association in his article in the Boston Sunday Herald of August 23 gives some very interesting

statistics in regard to the annual fire loss and brings out very closely the need of taking some action in regard to it.

Since that article appeared, the subject has been forcibly brought to the attention of the public by the conflagration at Rawhide, Nevada, by the garage fire in Boston, forest fires near Duluth, Minn., and many others. If this annual loss per capita were decreasing there would not be so much need to worry, but it is not. The fire loss for August, 1908, was a little over $23,000,000 or $3,000,000 larger than last year.

We must reduce the fire waste just as surely as we must preserve our forests and conserve various other resources if we are to continue to prosper in the future as we have in the past.

We are a wasteful, a short-sighted, and forgetful nation. We have our Iroquois Theatre horror; our steamship Slocum disaster; and our Baltimore, San Francisco and Chelsea conflagrations. They stir public sentiment for a little while. Some few remedies are applied, mostly temporarily; then the public soon forgets and things go on practically as before. But this slipshod mental attitude cannot go on forever. Something must be done sooner or later unless we are to drift back toward barbarism.

The sooner we take hold of the national ash heap problem the better. "What of it?" says the Average Man. "I can't do anything about it personally." Yes you can. Every one in the country can do something.

Fires do not occur without a cause, although sometimes the cause is difficult to determine. Practically every fire is traceable directly or indirectly to somebody's carelessness or ignorance. Carelessness is inexcusable. Ignorance can be corrected by education.

Education of the Public.

In the first place, the public must be educated to realize the extent of this wholly unnecessary waste and the need of constant vigilance to prevent it. Surely everyone can help in such a campaign. This education should be begun in the schools. Children should be taught the fear of fire just as soon as they are old enough to cause it. Children and matches is a frequent cause of fires; yet how many children are properly punished or reprimanded when caught in the act? A wholesome dread of fire should be inculcated into their minds and the severest punishment meted out when they disobey the injunction, "Do not play with fire." Every parent and every teacher can help in this work. Furthermore, there should be co-operation between parent and teacher to bring about the best results. The teacher's most careful work will go for naught if the child is allowed to play with fire at home.

As the child grows older, the temptation to play with fire increases, especially in boys. Bonfires, grass fires and fireworks are some of his greatest delights. These need not necessarily be entirely eliminated but a wholesome dread of the effects of a serious fire that he might cause should be thoroughly instilled into his mind.

The reckless use of fire-crackers and fireworks by children in crowded cities should not be allowed by parents and if necessary should be prohibited by law.

Camp Fires.

Camp fires and bonfires are built even by grown-up persons with but little regard to the possible danger of spread. Of the millions of dollars' worth of standing timber burned annually a very large proportion is caused by the carelessness of campers and others who build fires in the woods. It is said that the American Indians, savage as they were, never left a camp fire without sending a man back to make sure that no dangerous sparks remained. How does our 20th century civilization compare with theirs in this respect?

If our laws could be made a little more stringent, so that a person who allowed a camp fire to spread could be held in some way responsible in proportion to the damage caused, it would certainly assist in reducing the loss from this cause.

Parlor Match Crusade.

A crusade should be made against the so-called parlor or snap match. These are innocent enough to look at but they are responsible for many fires. In trying to light one, the head frequently breaks off. This may fall burning to the floor and start a fire at the time, but the greatest danger comes from the

heads or perhaps the whole matches which are allowed to remain on the floor. These may be ignited by being stepped on or they may be swept up and carried off finally to be ignited in some distant dump.

Many a lady has had a narrow escape from a bad burn by stepping on a parlor match when dressed in light combustible skirts, and a few have not been so fortunate as to escape.

Parlor matches are also a very prolific source of fires in cotton and woolen mills where they become mixed with the stock and ignited by passing through the pickers.

The so-called safety match reduces the danger of the match hazard to a minimum. While no match is fool-proof and all will ignite paper if thrown burning into a waste paper basket, still the safety match can only be lighted on the box and it is as near fool-proof as it would seem possible to make it. With safety matches at five cents per 500 (exactly the same price as parlor matches) there is no excuse for anyone using anything else. If the public cannot be persuaded to use them in any other way, there should be laws passed prohibiting the sale of any but safety matches.

Hot Ashes, Chimneys and Flues.

A campaign should also be started against the careless disposition of hot ashes and neglect in safeguarding flues, etc. Anyone with common sense knows that red-hot ashes dumped against woodwork or other combustible material will set it on fire. Yet this is constantly being done. Furthermore, a pile of hot ashes will hold the heat in the centre for a long time and may start a fire hours after it has been dumped.

Sensible people also know that a hot smoke-pipe running close to woodwork, defective chimneys containing holes and poorly built fireplaces will cause fires. Still there are many hundreds of fires from these causes annually. If every householder in the country should make a careful inspection of his premises every fall and see that all flues, chimneys, etc., are in good condition, many thousands of dollars would be saved.

Oily Rags, Waste and Rubbish.

Another prolific cause of fires is oily rags and waste. Painters' rags containing linseed oil are the worst. All vegetable oils are oxidizing oils, that is, they unite with oxygen and dry when exposed to the atmosphere. It is this oxidation that causes heat and finally spontaneous combustion. This is accentuated if the rags are piled together in a heap. Animal oils, like lard, whale oil, etc., are somewhat less dangerous and mineral oils like petroleum are the least liable to spontaneous heating. No oily rags of any kind should be allowed to accumulate, but should be burned as soon as possible.

Piles of rubbish of almost any description are more or less dangerous as they are always liable to contain some rags or similar material and some oil. Besides this, rubbish is easily ignited by sparks, matches and cigarette butts. Do not let rubbish accumulate. There is no need of it. Cleanliness besides being next to godliness is a great fire preventive.

Careless Smoking.

The smokers of the country are responsible for many fires. This is too well known to need explanation. Don't throw down stubs in combustible places. Don't throw down a match until you are sure it is entirely out. Don't put hot pipes in your pocket. Don't allow smoking in your factory or in your store if there is combustible material about. Don't allow smoking in your barn, in your lumber yard, or any similar places.

When uniformed officials of a steamship company are seen smoking under a "no smoking" sign on a pier filled with combustible materials, it is evident that the time has come for somebody to do something.

Fire Extinguishers.

The prompt extinguishment of fire is next in importance to fire prevention. Pails of water are the cheapest and one of the best extinguishing agents. Small hose, such as garden hose, is frequently available. Fires in the home

can often be extinguished with rugs but care should be taken to use only woolen rugs for this purpose.

The best household extinguisher is a three-gallon approved chemical extinguisher. Every householder who can scrape together eight or ten dollars should invest in one of these useful devices. But only those approved by the National Fire Protection Association and labelled by the Underwriters' label, as these labels are a guarantee that the extinguisher has been built under the Underwriters' rules, tested and found to be all right, should be used.

They should be operated and refilled at least once a year. The materials for recharging can be bought at any drug store and cost only a few cents. Every one in the house should operate the extinguisher so as to become familiar with it and know just what to do in case of emergency.

If every family should have one of these extinguishers, a great many serious fires could be prevented.

Don't waste money on dry powder extinguishers which cost about two dollars a tube. The powder is but little better than so much sand and costs one hundred times as much.

So much for family remedies. Next let us consider what can be done to prevent the spread of fires in cities, for it is in such fires that the most money is lost.

Work of the National Board of Fire Underwriters.

The National Board of Fire Underwriters began after the Baltimore Conflagration to investigate the conflagration hazard of all the principal cities in the country. They have a large force of men devoting their whole time to this work at a cost of many thousands of dollars a year. They have already reported on about 40 cities in New England, besides a large number in other parts of the country. This is not entirely a selfish undertaking on the part of the Insurance Companies and the direct benefit they secure from it is small. It is done largely for the good of the community. Many defects are found and many recommendations for improvements are made. Copies of these reports together with the recommendations are sent to the mayor of each city reported upon and to others in authority. How are they received? In most cases, they are entirely ignored and in some cases, they are criticised and ridiculed by those in authority. The persons who are responsible for these conditions do not acknowledge their faults like men, but rather try to deny them or shift the responsibility onto others.

"What can I do?" says the Average Man. Tell your councilmen and representatives that improvements must be made and if they do not assist, refuse to vote for them.

Attitude of Water Departments.

Another thing that is exasperating to the insurance engineer who is unselfishly trying to reduce the fire loss is the attitude of water departments toward private fire protection. Instead of co-operation, he too frequently finds hostility. It has been proven by 25 years' experience that automatic sprinklers are the best form of private fire protection yet invented. Sprinklers are always on the spot ready to open when the temperature reaches 160 degrees and they will put out a fire with less expenditure of water than any other device. But they need good water supplies behind them. Public water is usually the best supply available and a connection from the street main large enough to supply all the sprinkler heads on one floor is necessary for proper protection. But many water department officials instead of recognizing the great value of this device to the community look at it from the point of view of a device that will use their water, which may under remote circumstances waste water through a broken pipe and may once in a great while permit of the stealing of some water through an unmetered connection. They therefore put numerous obstacles in the path of the insurance engineer and the public by unnecessarily restricting the size of connection and by requiring meters when other simpler and less detrimental devices will accomplish the same purpose.

What can the Average Man do? Study the situation and help elect water boards that will assist in reducing the fire loss by allowing adequate private protection.

Better Buildings.

The average American city is full of fire-traps. Buildings of great areas without fire cut-offs, with large floor openings, with unprotected windows and with very combustible contents are too numerous to prove the exception to any rule. These are conflagration breeders. Fire travels through them rapidly and under certain conditions can get beyond even the best fire department and sweeping through the unprotected windows of surrounding buildings will soon cause a conflagration. All such buildings should be equipped with automatic sprinklers and there should be municipal ordinances requiring it. It is true that many of these fire-traps are being replaced by so-called fireproof buildings and there is no doubt that the construction of our cities is gradually improving. Still a large number of fire-traps still remain and a large number of the so-called fireproof buildings are far from fireproof. The steel work is improperly insulated and a hot fire will cause it to buckle if not to collapse. Many of the concrete buildings are poorly built and would collapse under a moderate fire, if indeed they do not collapse before they are finished.

But the worst feature of all in the modern fireproof building is the lack of window protection. Think of making floors 8 to 12″ thick and enclosing stairs and elevators in a wall of equal thickness to prevent the spread of fire from floor to floor and then leaving a row of openings at the walls on each floor protected only by ⅛″ window glass. No fireproof building in a congested district is worthy of the name unless it has all exposed windows protected by wired glass or standard shutters.

What can the Average Man do to improve conditions? If he is a property owner and is building a new fireproof building, see that it really is fireprŏof and that the windows are protected.

If he owns a combustible building, protect it with automatic sprinklers and automatic alarm. It will be a paying investment, for in nine cases out of ten, the reduction in insurance will pay the cost of improvements in from three to five years.

If there were laws in this country similar to those in France, that make a property owner liable for damage if a fire spreads beyond his premises it would have a tremendous influence on our fire loss.

If he is a builder, do his work thoroughly and conscientiously. Do not allow cheap and unsafe walls to be built; see that concrete contains the proper constituents and is thoroughly mixed; see that steel work in fireproof buildings is thoroughly insulated; see that fire stops are placed at intervals in concealed spaces; see in short that all the underwriters' rules are obeyed.

If he is an architect, advise his customer to put up only first-class construction; demand that window openings of fireproof buildings in congested sections be protected; advise against large areas (over 5,000 square feet) in one fire section; specify only first-class materials such as standard 2½″ tin covered fire doors, approved wire glass windows, etc.; and finally co-operate more with the fire insurance representatives.

The Underwriters' Laboratories in Chicago has the best facilities in the country for testing building materials, fire doors, and all kinds of fire protection devices. They are constantly making tests and publishing the results through the National Fire Protection Association. Such tests made by disinterested parties in a thoroughly scientific manner are of the utmost importance and value to the architect and builder, yet but few of them know anything about what is being done along those lines and many that do fail to use this knowledge in practice.

Better building laws are needed as well as laws for the handling of explosives and inflammable liquids, for the storage of automobiles in congested districts and for controlling many other dangers. Try to have such laws passed and try to have the present laws enforced even though they be inadequate.

Value of the National Fire Protection Association.

Finally, the Average Man can see that the childish excuse, "ignorance," does not apply to him.

Ignorance of the law does not save a man in court. Ignorance of the subject of fires and fire protection should not save a man before the court of public opinion when a conflagration starts on his premises. Study the subject. Read up the fire protection literature. Join the National Fire Protection Association and receive its publications.

Something should be done.

The Average Man can surely do a little.

Mr. H. L. Phillips, Chairman of our Executive Committee, read a paper at the Annual Convention of the National Association of Local Fire Insurance Agents, entitled **"The Improved Risk. A Problem for the Local Agent."** In this paper Mr. Phillips gives a brief history of mill fire protection showing the effect of automatic sprinklers and other modern protection on the business of the local agent. Mr. Phillips concludes with some general remarks on improved methods of construction and fire protection, calling special attention to the valuable aid which can be given by the local insurance agent in our attempt to reduce the fire loss of the country. He concludes as follows:

I am inclined to think also that these changes in the conduct of the underwriting business are not to be limited to one group or class of risk, but that the business of general underwriting is likewise undergoing a change or transformation.

The improved methods of construction in which the greatest strides have been made during the past five or ten years coupled with the application of advanced fire protection are just as sure to extend into the general business as that daylight follows darkness, and this changed condition should be welcomed by each and every one who is interested at all in the proposition and all should be interested, because what is there that will tend to stem the tide of growing conflagrations with any success but the introduction of fireproof construction together with automatic fire extinguishing apparatus.

A careful study of the many conflagrations which have occurred in this and other countries, shows that conflagrations are stopped in three ways. First, by burning themselves out, there being nothing left for the flames to feed upon. Second, by being brought under control with the assistance of apparatus summoned from the nearby cities and towns, and third, by being hemmed in and stopped by buildings of improved or fireproof construction, equipped with automatic fire apparatus.

The first is a relic of the dark ages. The second not always reliable, and likely to be expensive, but the third is well within human control.

To increase the rates will not stop conflagrations, to refuse to issue policies in a given congested district may protect the insurance company, but offers no help to the community, and while the applications of fire-proof construction and the introduction of fire protection tends to lower rates and thus decrease the compensation of the agent, the public will demand these things and no power under heaven can stop the advance any more than we can dam the waters of Niagara.

Like many another problem, this subject resolves itself into an educational proposition, and twelve years ago the National Fire Protection Association was formed "to promote the science and improve the methods of fire protection and prevention; to obtain and circulate information on these subjects, and to secure the co-operation of its members in establishing proper safeguards against loss of life and property by fire."

This Association was originally comprised of the underwriting organizations of stock fire insurance companies, but its scope was subsequently very materially broadened and many national institutes, societies and associations interested in the protection of life and property against loss by fire are now counted among its active members.

This Association acts in an advisory capacity in formulating and promulgating rules and standards covering the construction and installation of fire protection devices which are almost universally adopted at the present time, and while none of its members is bound to any course of action its influence is greatly broadened through a membership comprised of the various interests.

The National Fire Protection Association extends its most cordial greetings to the National Association of Local Fire Insurance Agents assembled at its twelfth convention, wishes you an eminently satisfactory and successful meeting, and hopes that it may soon count among its active members your very important organization. I can assure you of a hearty welcome, and know that the National Fire Protection Association will be capable of greater achievements with your association added to its membership, for you comprise the

men that have the direct dealings with the people, and it is the people who must be reached and educated.

The world moves, and as it travels on it is the duty of every citizen to do his share in the work. Sometimes it is perhaps apparent that we don't just know our own sphere or the object for which we are placed upon this earth and perhaps it is more often apparent to others than to ourselves just what we can do or what we ought to do. In other words, "advice is cheap." But be that as it may, there are certain organizations which have the power within them to exert a great influence on the progress of the nation and there is no body of men always in the public eye and continually circulating amongst the public which can do more to reduce the fire waste of this country, than the National Association of Local Fire Insurance Agents with its thousands of members and the possibility of many thousands more if the movement becomes a unanimous one. You have it within your power more than anybody else to make the cities of this country safe against conflagrations, and knowing well as I do the character of the men engaged in the agency business, for it requires a live man to be successful in these days of strenuous competition, there is little doubt in my mind but that your organization through its members will arise to the occasion and prove conclusively that it is not an organization solely for the advancement of the interests of its individual members, but that it proposes to take hold of a problem which seriously threatens the whole financial standing of this country and furnish a solution which will prove to be for the good of the nation and for the good of humanity.

Mr. J. A. Archibald, Chief of Cincinnati, Ohio, Fire Department, read a paper before the Fire Chiefs' Convention, entitled **"The Proper Handling and Storage of Gasolene in Dry Cleaning Establishments and Automobile Garages."** In this paper Mr. Archibald calls attention to the ever increasing hazard of gasolene cleaning establishments and automobile garages and suggests detailed improvements including the proper care and handling of gasolene. He emphasizes what has been found in many other cities, namely, the criminal carelessness exhibited by most people handling gasolene in large quantities and the difficulty in securing the necessary reforms. We have already had a number of serious fires in automobile garages, jeopardizing other property as well, and in most cases these fires have been very difficult to handle and control. Undoubtedly the only solution is for each city to provide most stringent regulations for the construction of these buildings including the use and handling of gasolene, as well as providing proper interior fire protection. We know that some cities have made considerable headway in this matter but it appears that as a whole comparatively little has been done and the danger is growing. This problem is certainly worthy of most serious consideration.

The Journal of Commerce recently published a list of fires in Automobile Garages showing the following results:

Period, one year, September 18, 1907, to September 22, 1908.
Number of fires, 80.
Total loss, $1,862,400. (No figures given in two fires.)
Average loss per fire, $23,877.
Causes of fires:

- Leaky tank in automobile, five.
- Gasolene ignited while filling tank, two.
- Gasolene ignited, six.
- Short circuit ignited gasolene, one.
- Short circuit of dry batteries, one.
- Kerosene ignited, one.
- Lamp exploded, one.

Efficiency of Water Supplies. In table No. 14 of the fire record of various classes we give data on the efficiency of the various water supplies to automatic sprinklers, namely, waterworks, gravity tanks, pressure tanks and automatic pumps. We have summarized these tables covering all of the classes so far reported upon except grain elevators, cereal mills and flour mills, this summary including a total of 1,675 sprinkler fires. The classes reported upon vary greatly in character and should give a fair average. The combined table is as follows:

Efficiency of Water Supplies.					Number of Fires.			Per Cent. of Fires.		
	Number of fires	Per cent. of fires	Average Pressure	Average number Sprinklers opened	Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory
Waterworks,	814	49	63	8.3	542	223	49	67	27	6
Gravity tank,	398	24	20	6.9	234	128	36	59	32	9
Pressure tank,	343	20	91	4.7	283	52	8	83	15	2
Automatic pump,	120	7	64	9.7	83	26	11	69	22	9
Total,	1675		53	7.3	1142	429	104	68	26	6

It will be noted that the waterworks system was the primary supply to automatic sprinklers in about one-half of the fires, gravity tank was primary supply in about one-fourth of the fires, pressure tank in about one-fifth, and automatic pump in seven per cent. only.

So far as the average pressures are concerned it will be noted that the waterworks and automatic pump are about the same, averaging 63 to 64 pounds, while the average pressure on sprinklers operating under gravity tank supply was only 20 pounds. The average with pressure tanks was much higher than with either of the other supplies, being about 91 pounds.

The fourth column gives the average number of sprinklers opening in each fire, not including the unsatisfactory fires. The pressure tank supply shows up the best so far as average number of sprinklers opened is concerned, with the gravity tank next, this latter rather tending to show that the pressure has less effect on the number of sprinklers opened than might be supposed.

The last three columns show the efficiency of the various water supplies so far as sprinkler control is concerned. The pressure tank shows up the best with only eight unsatisfactory fires or two per cent., the waterworks supply comes next with 49 fires or six per cent. unsatisfactory, the gravity tank and automatic pump both show nine per cent. unsatisfactory.

So far as extinguishing (or practically extinguishing) the fire at once is concerned, the pressure tank again shows up the best with 283 fires or 83 per cent., the gravity tank shows up the poorest with 234 fires or 59 per cent.

From these tables it would appear that the pressure tank is superior to any of the others, this probably being due to two features, namely heavy pressure and constancy of service. The waterworks supply comes next and apparently on the average it is not the equivalent of the pressure tank, either as to water pressure or reliability.

It must of course be understood that these figures only include a portion of the sprinkler fires and a limited number of classes and they should be studied in connection with the various fire records already reported upon in detail, as these fire records give information on all of the unsatisfactory fires and the reasons therefor.

Secretary's Report, Branch Offices, and Underwriters' Laboratories.

SECRETARY'S REPORT.

By vote of the Executive Committee the Association has decided to join as an active member the Conservation League of America. The principles of this League and the work it hopes to accomplish have been described and commented on in the daily papers. The officers of the League are, Honorary President, Theodore Roosevelt, Honorary Vice-Presidents, William H. Taft and William J. Bryan. President, Walter L. Fisher, of Chicago.

CONSERVATION LEAGUE OF AMERICA.

STATEMENT OF PRINCIPLES.

WHEREAS, it is of the utmost importance that the natural resources of the nation shall be comprehensively and vigorously developed and utilized for the promotion of the public welfare without waste, destruction or needless impairment, and subject always to their intelligent conservation and the effective preservation of the rights and interests of the future generations of our people;

Now, therefore, to secure the recognition and support of these principles by the people and by their representatives, we hereby unite in a National Conservation League, and adopt for ourselves the following, taken from the Declaration unanimously adopted by the Conference of Governors, convened by the President of The United States, in the White House at Washington, on May 13, 14 and 15, 1908.

We do hereby declare the conviction that the great prosperity of our country rests upon the abundant resources of the land chosen by our forefathers for their homes, and where they laid the foundation of this great Nation.

We look upon these resources as a heritage to be made use of in establishing and promoting the comfort, prosperity and happiness of the American people, but not to be wasted, deteriorated, or needlessly destroyed.

We agree that our country's future is involved in this: That the great natural resources supply the material basis upon which our civilization must continue to depend, and upon which the perpetuity of the nation itself rests. We agree that this material basis is threatened with exhaustion.

We agree that the land should be so used that erosion and soil-wash shall cease; and that there should be reclamation of arid and semi-arid regions by means of irrigation, and of swamp and overflowed regions by means of drainage; that the waters should be so conserved and used as to promote navigation, to enable the arid regions to be reclaimed by irrigation, and to develop power in the interests of the people; that the forests which regulate our rivers, support our industries, and promote the fertility and productiveness of the soil should be preserved and perpetuated; that the minerals found so abundantly beneath the surface should be so used as to prolong their utility; that the beauty, healthfulness and habitability of our country should be preserved and increased; that sources of national wealth exist for the benefit of the people, and that monopoly thereof should not be tolerated.

We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance, which should engage unremit-

tingly the attention of the nation, the states and the people in earnest co-operation.

We agree that this co-operation should find expression in suitable action by the Congress and by the Legislatures of the several States.

Let us conserve the foundations of our prosperity.

At the recent meeting of the Executive Committee the further enlargement of the Device and Material Committee brought out the thought that possibly all active members will be interested to receive the detailed Laboratory reports of examinations and tests, and these might hereafter be printed and sent to all active members rather than made up in their present form and distributed to committee members only. No action was taken on the matter, it being held open for further consideration. If any active member finds the card cabinet giving summaries of Laboratory reports insufficient, and would like to receive the printed reports in addition, it might be well to file a request with the Secretary, so that it can be taken up at the next meeting.

LIST OF MEMBERS ELECTED BY THE EXECUTIVE COMMITTEE SINCE LAST MAY.

JUNE, 1908.

ACTIVE.

Massachusetts Mutual Fire Insurance Union, 101 Milk Street, Boston, Mass.

ASSOCIATE.

Mr. W. C. Barnes, Inspector, Insurance Department, The American Cotton Oil Company, 27 Beaver Street, New York, N. Y.

Mr. Joseph J. Bell, Inspector for Burnett, Ormsby & Clapp, Insurance Brokers, 7 Melinda Street, Toronto, Canada.

Mr. Edwin J. Carter, Special Agent, Security Insurance Company of New Haven, Box 1186, Oklahoma City, Oklahoma.

Mr. J. A. Daggett, Manager, Security Insurance Company, Rockford, Ill.

Mr. M. S. Davidson, General Inspector, Hartford Fire Insurance Company, 171 La Salle Street, Chicago, Ill.

Mr. Henry M. Fenton, Special Agent, Hartford Fire Insurance Company, 71 Kilby Street, Boston, Mass.

Mr. Lester A. Grimes, New York Fire Insurance Exchange, 32 Nassau Street, New York, N. Y.

Mr. J. W. Grover, Special Agent, Phoenix Assurance Company of London, 30 Kilby Street, Boston, Mass.

Mr. Frank G. Herman, Special Agent, Northern Insurance Company of New York, Mattoon, Ill.

Mr. Joel B. Ives, General Inspector, Phoenix Insurance Company of Hartford, Corner 4th and Elm Streets, Cincinnati, O.

Mr. Edward J. Meagher, Inspector, Cincinnati Fire Prevention Bureau, 1403 First National Bank Building, Cincinnati, O.

Mr. Hal E. Middleton, Insurance Agent, Box 1108, Calgary, Alberta, Canada.

Mr. Sumner Miller, Special Agent, Security Insurance Company of New Haven, Brown Building, Rockford, Ill.

Mr. Clifford H. Rice, General Agent, The Niagara Fire Insurance Company, 87 Kilby Street, Boston, Mass.

Mr. Edwin H. Seaman, Inspector, Underwriters at American Lloyds, 45 Cedar Street, New York, N. Y.

Mr. J. Monroe Shaw, Inspector, Cincinnati Fire Prevention Bureau, 1403 First National Bank Building, Cincinnati, O.
Mr. C. H. Smith, Inspector, Underwriters' Bureau of Middle and Southern States, 72 William Street, New York, N. Y.
Mr. J. M. Wennstrom, Civil Engineer, Assistant Foreign Secretary, Svea Insurance Company, 100 William Street, New York, N. Y.

SUBSCRIBING.

Mr. Robt. C. Baker, Assistant Superintendent, American District Telegraph Company, Room 248, 159 La Salle Street, Chicago, Ill.
Mr. H. W. Bellard, Secretary and Auditor, The Colorado Telephone Company, Denver, Col.
Mr. C. W. Boynton, Chief Inspector, Universal Portland Cement Co., Commercial Bank Building, Chicago, Ill.
Mr. P. M. Cabell, Manager Publicity and Promotion, General Fire Extinguisher Company, German American Building, New York, N. Y.
Mr. R. C. Clark, Armour & Company, Union Stock Yards, Chicago.
Mr. J. A. Ferguson, President, The American Hydraulic Stone Company, 221 Railway Exchange Building, Denver, Col.
Mr. Frank W. Lovejoy, General Manager, Manufacturing Departments, Eastman Kodak Company, Rochester, N. Y.
Mr. Geo. McGann, Assistant Superintendent, American District Telegraph Company, 101 Fullerton Building, St. Louis, Mo.
Mr. John McRobie, Superintendent, American District Telegraph Company, 159 La Salle Street, Chicago, Ill.
Mr. F. C. Park, Secretary, Arbogast-Brock Glass Company, 606-609 Berger Building, Pittsburg, Pa.
Messrs. Parrish & Thornton, Managers, Southeast Corner Pine and Sansome Streets, San Francisco, Cal.
Peet Bros. Manufacturing Company, Soaps and Glycerine, Stock Yards Station, Kansas City, Kan.
P. C. Ralli & Company, Insurance Brokers, 50-52 Pine Street, New York, N. Y.
Mr. Lucien I. Yeomans, Armour & Company, Union Stock Yards, Chicago, Ill.

JULY, 1908.

ASSOCIATE.

Mr. I. B. Beard, Special Agent, St. Paul Fire and Marine Insurance Company, Tennessee Trust Building, Memphis, Tenn.
Mr. A. W. Blake, Inspector, London and Lancashire Fire Insurance Company, Box 118, Winnipeg, Manitoba, Canada.
Mr. John Breemer, Special Agent, North British & Mercantile Insurance Company, Union Trust Building, Harrisburg, Pa.
Mr. Ward H. McPherson, McPherson-Carter Company, General Insurance, 10 Builders' Exchange, Court Street, Buffalo, N. Y.
Mr. T. D. Olmsted, Inspector, Factory Insurance Association, 5 Haynes Street, Hartford, Conn.
Mr. Wm. W. Roberts, Inspector, Gordon, Roberts & Company, 56-58 Pine Street, New York, N. Y.

SUBSCRIBING.

The Fowler Packing Company, Packers, Kansas City, Kansas.
Mr. Franklin Hardinje, President, Hardinje Bros., Incorporated, 1036 Lincoln Avenue, Chicago, Ill.

AUGUST, 1908.

ACTIVE.

The National Hardware Association of the United States, Mr. T. James Fernley, Secretary-Treasurer, 505 Commerce Street, Philadelphia, Pa.

ASSOCIATE.

Mr. E. L. Barkley, Manager, Arkansas Inspection and Fire Prevention Office, P. O. Box 1042, Memphis, Tenn.
Mr. A. F. Breedenbeck, Insurance Broker, Marnixstr. 148, Amsterdam, Holland.
Mr. B. P. Flint, Jr., Inspector, Fire Underwriters' Inspection Bureau, 29 Commercial Block, Salt Lake City, Utah.
Mr. Chas. W. Johnson, Inspector, Factory Insurance Association, 48 Queen Street, Worcester, Mass.
Mr. Herbert H. Ray, Inspector, Atlas Assurance Company, Limited, 100 William Street, New York, N. Y.
Mr. Ben B. Weaver, South-Eastern Underwriters' Association, Wilson, N. C.

SUBSCRIBING.

Mr. H. G. Cook, Globe Automatic Sprinkler Co., 219 Fifth Street, South, Minneapolis, Minn.
McKinney & Allen, Sioux Falls, S. D.
The J. A. Ritzler Cornice and Ornament Company, Manufacturers of Fire Windows, 2408 E. 18th Street, Kansas City, Mo.
Mr. Jas. F. McWilliam, with J. E. McWilliam & Sons., 518 Main Street, Worcester, Mass.
Philip K. Williams, with J. B. Williams Company, Glastonbury, Conn.

APPROVED DEVICES AND MATERIALS.

By direction of the Executive Committee (action November, 1907) we list below in form convenient for reference by members the names and addresses of manufacturers of devices and materials which have thus far been favorably passed upon by the Committee of Devices and Materials, following examinations, tests and recommendations made by Underwriters Laboratories, Inc.

The Laboratories have also issued reports giving ratings unfavorable to a large number of appliances. A summary of the findings in each case can be obtained by addressing the Laboratories and any Active or Associate member can receive regularly the cards issued by the Laboratories giving summaries of the results obtained in the current work in all of its departments upon payment of the subscription price of fifteen dollars ($15) per year.

In the lists which follow members should note particularly that in those industries to which the label service has been extended (indicating inspection of goods by Laboratories' engineers at factories before shipment) that **only such of the product of these factories as bear the labels referred to** are covered by the endorsement of our Committee.

BUILDING MATERIAL.

Post Cap and Girder Support (Steel and Malleable Iron).

Caps inspected at factory bear labels attached to an exposed side reading as follows: *(See Cut No. 1.)*

The following company is equipped to supply these devices. Members are advised to give preference to devices which bear the label referred to.

Chicago, A. M. Castle & Co., 55 N. Jefferson Street.

CARBONIC ACID GAS HAND FIRE EXTINGUISHERS, 3 Gallons.

Carbonic Acid Gas Hand Fire Extinguishers constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc.,

have metal labels soldered to the front of the cylinders reading: *(See Cut No. 2.)*

The following companies are equipped to supply these devices. Members are advised to give preference to extinguishers which bear the labels referred to.

Boston, Badger Fire Extinguisher Co., 32 Portland Street.
Boston, Knight & Thomas, 99 State Street.
Buffalo, Western Inspection Co., 45 N. Division Street.
Chicago, Miller Chemical Engine Co., 149 E. Huron Street.
Cincinnati, Harker Mfg. Co., 118 W. Second Street.
Columbus, Seagrave Company, South High Street.
Elmira, N. Y., American-LaFrance Fire Engine Co., Elmira.
Newark, N. J., The Tea Tray Company of Newark, N. J., Mulberry and Murray Streets.
Petrolia, Ont., Canada, Stempel Mfg. Co., Ltd.
Philadelphia, James Boyd & Bro., 14 North Fourth Street.
Philadelphia, National Inspection Co., 418-422 Sansom Street.
Pittsburg, Fire Extinguisher & Supply Co., 1414-1422 Spring Garden Avenue, N. S.
Pittsburg, Pittsburg Lamp, Brass & Glass Co., Pittsburg.
Racine, Wis., Racine Iron & Wire Works, 1022 Douglas Avenue.
St. Louis, Frank & St. Gemme Mfg. Co., 815-817 Market Street.
St. Louis, Missouri Lamp and Mfg. Co., 116 Elm Street.
St. Louis, Stempel Fire Extinguisher Co., 4250 North 20th Street.
Toronto, Canada. Victor Fire Extinguisher Company, 704 Continental Life Building.
Utica, O. J. Childs Co., 50 Liberty Street.

CARBONIC ACID GAS FIRE EXTINGUISHERS, 40 Gallon.

Carbonic Acid Gas Fire Extinguishers of 40 gallon capacity mounted on wheels, constructed in accordance with the latest specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels soldered to the front of the cylinder reading as follows: *(See Cut No. 3.)*

The following company is equipped to supply these devices:

Boston, Badger Fire Extinguisher Co., 32 Portland Street.

DOORS.

N. F. P. A. Standard 2½ inch metal clad.

Doors of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., are labeled by stampings in the tin plates or by attaching brass labels reading: *(See Cut No. 4.)*

The following companies are equipped to supply these devices. Members are advised to give preference to doors which bear labels referred to.

Akron, The Kasch Roofing Co.
Buffalo, Chas. Bauers' Sons, 159 William Street.
Buffalo, Dusing & Hunt, 76 Main Street.
Buffalo, Machwirth Bros. Co., 201-209 Oak Street.
Buffalo, G. H. Peters & Co., 289-293 Oak Street.
Chicago, J. L. Lyon, 64 North Jefferson Street.
Chicago, J. C. McFarland & Co., 27th Street and Fifth Avenue.
Cleveland, Cleveland Sheet Metal Works, 6933-5 Superior Avenue.
Cleveland, Cleveland Metal Roofing & Ceiling Co., 303-5 Detroit Avenue.
Cleveland, J. Callaghan & Son, 1119 Superior Avenue.
Cleveland, O'Donnell Safety System Co., 3062 Superior Avenue, N. E.
Cleveland, Ohio Roofing Co., 1477 Euclid Avenue.
Cleveland, Riester & Thesmacher Co., 325-329 Pearl Street.
Milwaukee, Consolidated Sheet Metal Works, 661-673 Hubbard Street.

Minneapolis, Minn., Stremel Bros. Roofing & Cornice Co., 1215 Washington Avenue, North.
Newburyport, Victor Manufacturing Co.
New Orleans, American Sheet Metal Works, Carrollton Avenue and Edinburg Street.
New Orleans, Estate of R. G. Holtzer, 317-323 Burgundy Street.
New Orleans, A. J. Nelson Manufacturing Co., Ltd.
New Orleans, New Orleans Roofing and Metal Works.
New York, Howell & Lawrence, 1788 First Avenue.
New York, Manhattan Fire-Proof Door Co., 412-422 E. 125th Street.
New York, John W. Rapp, 1 Madison Avenue.
Richmond, Ind., Richmond Safety Gate Co.
St. Louis, Albert & Fischer Hardware & Sheet Metal Co., 2529 South Broadway.
St. Louis, J. Eberle & Son, 4014 Laclede Avenue.
St. Louis, O. K. Harry Steel Works, 2333-5 Papin Street.
St. Louis, Frank B. Higgins, 924 North Sixth Street.
St. Louis, Hopman Cornice Co., 2500-2 North Jefferson Street.
St. Louis, Mesker & Bro., 421-519 S. Sixth Street.
St. Louis, Missouri Fire Door Co., 100 South Commercial Street.
St. Louis, Powers & Boyd Cornice and Roofing Co., 3614-16 Laclede Avenue.
St. Louis, Richmond Safety Gate Co., 1117 Chemical Building.
St. Louis, St. Louis Fire Door Co., Cass and Collins Streets.
St. Louis, E. E. Souther Iron Co., 2206 North Second Street.
St. Louis, Van Der Au & Cluss Mfg. Co., 2408 Jefferson Avenue.
St. Louis, Wand & Niehaus, 3008 Kossuth Avenue.

Door and Shutter, Metal.

Doors of this class which are considered to be the equivalent of the N. F. P. A. Standard 2½ inch metal clad door for openings not exceeding 72 inches in width and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels riveted to the door reading as follows: *(See Cut No. 4.)*

The following company is equipped to supply these devices. Members are advised to give preference to doors which bear label referred to.

Memphis, Tenn., Saino Fire Door and Shutter Co., 538 Lucy Avenue.

Corridor or Partition Doors. (Not for openings in fire walls.)

Doors of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels screwed or riveted to the edge of the door reading: *(See Cut No. 5.)*

The following companies are equipped to supply these devices. Members are advised to give preference to doors which bear the labels referred to.

Chicago, Knisely Bros., Fifth Avenue and 28th Place.
Chicago, Voigtmann & Co., 42-54 East Erie Street.
Jamestown, N. Y., American Metal Door Co.
Jamestown, N. Y., Dahlstrom Metallic Door Co., Jamestown.
Minneapolis, Minn., Northwestern Roofing, Cornice and Stamping Works, 113 S. Fifth Street.
Minneapolis, Minn. Thorp Fireproof Door Co., 1600-1616 Central Avenue.
New York, J. F. Blanchard Co., Broadway and 23d Street.
New York, Howell & Lawrence, 1788 First Avenue.
New York, Manhattan Fire Proof Door Co., 412-422 E. 125th Street.

Stair or Elevator Doors. (Not for openings in fire walls.)

Doors of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels screwed or riveted to the edge of the door reading: *(See Cut No. 6.)*

The following companies are equipped to supply these devices. Members are advised to give preference to doors which bear labels referred to.

Columbus, O., The Kinnear Mfg. Co.
Jamestown, N. Y., Dahlstrom Metallic Door Co., Jamestown
Minneapolis, Minn., Northwestern Roofing, Cornice and Stamping Works, 1113 S. Fifth Street.
Minneapolis, Minn., Thorp Fireproof Door Co., 1600-1616 Central Avenue.
New York, J. F. Blanchard Co., Broadway and 23d Street.
New York, Howell & Lawrence, 1788 First Avenue.
New York, Manhattan Fire Proof Door Co., 412-422 E. 125th Street.

DOOR AND SHUTTER HARDWARE.

3½ x ⅜ Hardware for Sliding Doors only.

Hardware of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading: *(See Cut No. 7.)*

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. **One 3½x⅜ inch track, length to be equal to twice the width of door opening plus 21 inches. Punched for wall bolts.**
2. **Two hangers for openings 6 feet and less in width, three hangers for openings wider than 6 feet. Bolts for attaching hangers to door.**
3. **Two 3½x⅜ inch binders.**
4. **One 2x½ inch stay roll.**

Stay roll should be the type specified for the form of sill used, and should include all bolts except wall bolts.

5. **One cast iron bracket for each track bolt.**
6. **Two ¾x¼ inch half oval chafing strips for back of door, two 1x⅛ inch flat strips for front of door opposite the oval strips. Bolts for fastening above strips together through door. Length of above strips to be 4 inches less than door opening.**
7. **One 1½x⅛ inch strip 5 inches less than width of door to take wear of stay roll. Wood screws for attaching.**
8. **One wedge with screws for attaching.**
9. **One bow shaped handle and one flush pull with bolts and screws for attaching.**
10. **One front bumper and one back bumper.**
11. **Four bumper shoes and screws for attaching.**
12. **One washer for each wall bolt, including those for binders and stay roll.**
13. **One instruction card for mounting.**

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included as the requirements for length varies in each case. Automatic attachments are not as yet included in a standard set of hardware.

UNDERWRITERS' LABORATORIES, Inc.,
382 Ohio St., Chicago.

The following companies are equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.

Aurora, Ill., Richard Mfg. Co., Aurora.
Aurora, Ill., Wilcox Mfg. Co., Aurora.
Milwaukee, Wis., Stowell Mfg. & Foundry Co.

Newburyport, Mass., Victor Manufacturing Co.
Philadelphia, James Peters & Sons, 1934-38 North Front Street.
Richmond, Ind., Richmond Safety Gate Co.

Specially Designed, Malleable Iron Hardware for Sliding Door Only.

Hardware of this type which is considered to be the full equivalent of the 3½ x ⅜ hardware made in accordance with National Fire Protection Association specifications, and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading: *(See Cut No. 7.)*

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. **One 1 7-16 inch tubular track, length to be equal to twice the width of the door opening, plus 14 inches.**
2. **Two hangers for openings six feet and less in width; three hangers for openings wider than six feet. Bolts for attaching hangers to door.**
3. **Two malleable iron binders.**
4. **One malleable iron stay roll.**
5. **Brackets to carry track, including two special end supports.**
6. **Two ¾x¼ inch half oval chafing strips for back of door, two flat strips for front of door opposite the oval strips. Bolts for fastening above strips together through the door. Length of above strips to be 4 inches less than door opening.**
7. **One 2¼x⅛ inch strip 5 inches less than width of door to take wear of stay roll. Wood screws for attaching.**
8. **One steel wedge with screws for attaching.**
9. **One bow shaped handle and one flush pull with bolts for attaching.**
10. **One front bumper and one back bumper.**
11. **Four bumper shoes and screws for attaching.**
12. **One washer for each wall bolt, including those for binders, bumpers and stay roll.**

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included as the requirements for length vary in each case. Automatic attachments are not as yet included in a standard set of hardware.

UNDERWRITERS' LABORATORIES, Inc.,
382 Ohio St., Chicago.

The following companies are equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.
Chicago, Allith Manufacturing Co., Taylor Street and 43rd Avenue.
Hamilton, Ont., Allith Manufacturing Co.

Specially Designed Malleable Iron Hanger and Brackets, and Tubular Steel Track With 3½x⅜ Inch Hardware.

Hardware of this type consisting of specially designed malleable iron hanger and brackets, and tubular steel track in combination with a complete set of approved 3½x⅜ inch fixtures for sliding doors, which is considered to be the full equivalent of the 3½x⅜ hardware made in accordance with the National Fire Protection Association specifications, and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading: *(See Cut No. 7.)*

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. One 1⅜ inch tubular steel track, length to be equal to twice the width of the door opening, plus 14 inches.
2. Two hangers for openings 6 feet and less in width; three hangers for openings wider than 6 feet. Bolts for attaching hangers to door.
3. Two 3½x⅜ inch binders.
4. One 2x½ inch stay roll.

Stay roll should be the type specified for the form of sill used, and should be provided with all bolts except wall bolts.

5. Malleable iron brackets for carrying tracks, including two special end supports.
6. Two ¾x¼ inch half oval chafing strips for back of door; two flat strips for front of door opposite chafing strips. Bolts for fastening strips together through door. Length of above strips to be 4 inches less than door opening.
7. One 1½x⅛ inch strip 5 inches less than width of door. Wood screws for attaching.
8. One wedge with screws for attaching.
9. One bow shaped handle, and one flush pull with bolts for attaching.
10. One front bumper and one back bumper, identical with and in addition to binders.
11. Four bumper shoes and screws for attaching.
12. One washer for each wall bolt, including those for binders, bumpers and stay roll.
13. One instruction card for mounting.

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included, as the requirements for length vary in each case. Automatic attachments are not as yet included in a standard set of hardware.

UNDERWRITERS' LABORATORIES, Inc.,
382 Ohio St., Chicago.

The following company is equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.

Aurora, Ill., Wilcox Manufacturing Co.

Specially Designed Malleable Iron Hangers, With 3½x⅜ Inch Hardware.

Hardware of this type consisting of specially designed malleable iron hangers in combination with a complete set of approved 3½x⅜ inch fixtures for sliding doors and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading: *(See Cut No. 7.)*

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. One 3½x⅜ inch track, length to be equal to twice the width of door opening, plus 21 inches. Punched for wall bolts.
2. Two adjustable malleable iron hangers for openings 6 feet and less in width; three hangers for openings wider than 6 feet. Bolts for attaching hangers to door.
3. Two 3½x⅜ inch binders.
4. One 2x½ inch stay roll.
5. One cast iron bracket for each track bolt.
6. Two ¾x¼ inch half oval chafing strips for back of door, two flat strips for front of door opposite the oval strips. Bolts for fastening the above strips together through door. Length of above strips to be 4 inches less than door opening.

7. One 1¼x⅛ inch strip 5 inches less than width of door to take wear of stay roll. Wood screws for attaching.
8. One cast iron wedge with screws for attaching.
9. One bow shaped handle and one flush pull with bolts for attaching.
10. One front bumper and one back bumper.
11. Four bumper shoes and screws for attaching.
12. One washer for each wall bolt, including those for binders and stay roll.

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included as the requirements for length vary in each case. Automatic attachments are not as yet included in a standard set of hardware.

UNDERWRITERS' LABORATORIES, Inc.,
382 Ohio St., Chicago.

Approval of this device is limited to locations where an adjustable hanger is acceptable to Underwriters having jurisdiction.

The following company is equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.

South Milwaukee, Wis., Stowell Mfg. and Foundry Co.

FIRE DOORS. (See Doors.)

GLASS. (See Wired Glass.)

HARDWARE. (See Door and Shutter Hardware also Window Hardware.)

HEAT INSULATING COVERINGS.

The following material is approved for heat insulating purposes for walls, floors and ceilings in cold storage warehouses, cold storage cellars in breweries, cold rooms in packing houses, hotel refrigerators, fur storage rooms and rooms of this character.

Cork Board (Nonpareil) laid in cement mortar. Manufactured by Armstrong Cork Co., Pittsburg, Pa.

HOSE.

2½ Inch Cotton Rubber-Lined.

Private Department Fire Hose for outside use constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have attached to each 50 foot length label reading: *(See Cut No. 8.)*

The following companies are equipped to supply this material. Members are advised to give preference to hose which bears label referred to.

Akron, O., B. F. Goodrich Co., Akron.
Cambridge, Mass., Boston Woven Hose and Rubber Co.
New York, Eureka Fire Hose Mfg. Co., 13 Barclay Street.
New York, Fabric Fire Hose Co., Corner Duane and Church Streets, Elkshead.
New York, Manhattan Rubber Mfg. Co., 18 Vesey Street.
New York, New York Belting and Packing Co., Ltd., 91 Chambers Street.

Before the extension of the label service to this industry approvals were granted to certain brands of hose manufactured by the foregoing and other companies as follows:

American, Boston Belting Co., 256 Devonshire Street, Boston, Mass.
G. P., Gutta Percha and Rubber Mfg. Co., 126 Duane Street, New York.
Guttaperch, Gutta Percha and Rubber Mfg. Co. of Toronto, Ltd., 47 Yonge Street, Toronto, Ont.
Security, Revere Rubber Co., Chelsea, Mass.
Star, Canadian Rubber Co., Notre Dame Street and Papineau Avenue, Montreal, Can.
Tuebor, New Jersey Car Spring and Rubber Co., Wayne and Brunswick Streets, Jersey City, N. J.
2-X-L, Mechanical Rubber Co., Cleveland, O.

HOSE, Unlined Linen.

Unlined Linen Fire Hose for use inside buildings constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., has attached to each length label reading: *(See Cut No. 9.)*

The following companies are equipped to supply this material. Members are advised to give preference to hose which bears the label referred to.
Cambridge, Mass., Boston Woven Hose and Rubber Co.
Malden, Mass., Chas. Niedner's Sons Co., 10-20 James Street.
New York, Eureka Fire Hose Mfg. Co., 13 Barclay Street.

HYDRANTS.

The hydrant manufactured by the following company has been examined and tested and pending the adoption of revised specifications for construction of devices of this class is recommended for use in connection with mill yard and other private underground fire mains. Service record generally satisfactory.

Indian Orchard, Mass. Chapman Valve Mfg. Co.

PAINTS, FIRE RETARDANT.

The so-called "cold water" paints listed below have been examined and tested.

These coatings for wood and other similarly combustible building materials which come under this class, or property so coated, should in no sense be considered as "fire-proof." Their use is preferable to leaving the material uncoated because they retard the spread of fire over combustible surfaces and are particularly desirable in lieu of varnish, shellac, or oil finish, which latter serve to rapidly spread fire. Attention is called, however, to the need of renewal of the coatings in order to maintain the desired conditions.

Whitewash so well meets the requirements of this class that we print formula recommended by the Lighthouse Board of the United States Treasury Department as follows:

"Slake one-half bushel of unslaked lime with boiling water, keeping it covered during the process; strain it and add a peck of salt dissolved in warm water; three pounds of ground rice, put in boiling water and boil to a thin paste; one-half pound powdered Spanish whiting and a pound of clear glue dissolved in hot water; mix these well together and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible with painter's or whitewash brushes."

Where possible the coatings should be applied by a hand brush rather than by a spraying machine, thus effecting a better surface, and special care should be exercised not to coat sprinkler heads where installed.

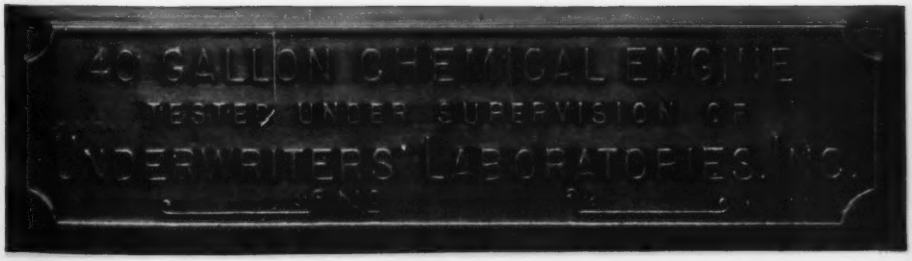
Asbestine. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
Carey's. Manufactured by The Neptune Paint Co., Hudson, Mich., for The Philip Carey Mfg. Co., Cincinnati, O.
Decorine. Manufactured by Benj. Moore & Co., 111 N. Green Street, Chicago.
Hygienic Fireproof Calcimine. Manufactured by The Rubber Paint Co., 154 W. Van Buren Street, Chicago.

APPROVED DEVICES AND MATERIALS

LABEL SERVICE.

Cut No. 1.

Cut No. 2.



Cut No. 3.

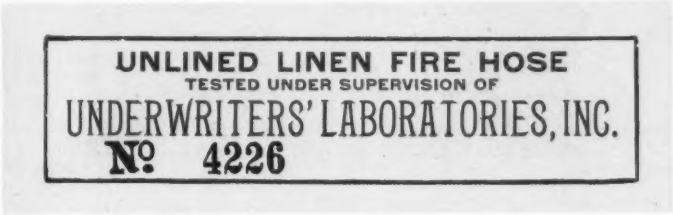
Cut No. 4.

Cut No. 5.

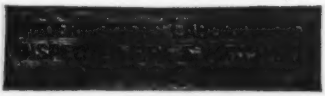
Cut No. 6.

Cut No. 7.

Cut No. 8.



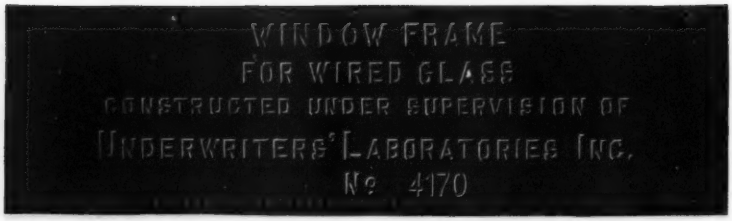
Cut No. 9.



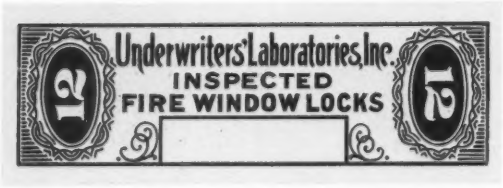
Cut No. 10.

Cut No. 11.

Cut No. 12.



Cut No. 13.



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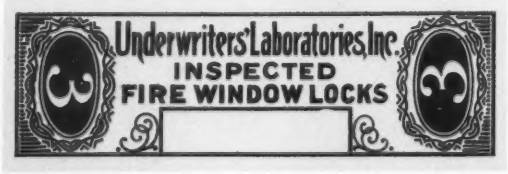


Cut No. 15.

Indeliblo. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
Indurine. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
J. M. Manufactured by The Neptune Paint Co., Hudson, Mich., for H. W. Johns-Manville Co., Milwaukee, Wis.
K'Sene. Manufactured by The Muralo Co., New Brighton, S. I., N. Y., for Western Roofing and Supply Co., Chicago.
Monarch. Manufactured by Geo. Fletcher & Co., 49-51 N. Ashland Avenue, Chicago.
Nepolite. Manufactured by The Neptune Paint Co., Hudson, Mich.
Retardo. Manufactured by Benj. Moore & Co., Chicago, for Retardo Fire Proof Paint Co., Milwaukee, Wis.

PLAY PIPE.

The National Standard Play Pipe for 2½ inch hose manufactured by the following manufacturer has been examined and tested and approved for use:

New York, Eureka Fire Hose Manufacturing Co.

ROOFINGS.

Certain proprietary roofings listed below have been examined and tested.

These tests indicate that the fire retardant properties of these materials are inferior to those of slate, metal or good tin-clad roofs, but in a class with those of good slag and good gravel roofs, and superior to those of wooden shingle roofs.

Arrow Brand Asphalt Ready Roofing (Prepared, 2 ply), Asphalt Ready Roofing Co., 136 Water Street, New York.
Amatite (Prepared), Barrett Manufacturing Co., 17 Battery Place, N. Y.
Amazon Ready Roofing, (Prepared, 2 and 3 ply), Barrett Mfg. Co., Philadelphia, Pa.
Becker Asphaltum Ready Roofing, (Prepared, 2 and 3 ply), F. Becker Asphaltum Ready Roofing Co., 1510-12 Milwaukee Avenue, Chicago, Ill.
Black Diamond, (Prepared, 2 and 3 ply), Barrett Mfg. Co., 17 Battery Place, N. Y.
Carey's Standard Magnesia Flexible Cement (Prepared), The Philip Carey Mfg. Co., Lockland, Cincinnati, O.
Carbonite (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.
Climax Asphalt, (Prepared, 2 and 3 ply), McHenry-Millhouse Mfg. Co., South Bend, Ind.
Congo (Prepared, 2 and 3 ply), The Buchanan-Foster Co., 504 West End Trust Bldg., Philadelphia, Pa.
Eclipse Rubber (Prepared), Ford Manufacturing Co., Washington and Desplaines Street, Chicago, Ill.
Ehrets (Slag), Warren-Ehret Co., 1202 Land Title Bldg., Philadelphia.
Elaborated Ready (Prepared), Elaborated Ready Roofing Co., 4419 La Salle Street, Chicago.
Flexo (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.
Galvanized Rubber (Prepared), Ford Manufacturing Co., Washington and Desplaines Streets, Chicago, Ill.
Genasco Asphalt Composition (4 ply), Barber Asphalt Paving Co., Philadelphia, Pa., for the Genasco Roofing Co., Chicago.
Genasco (Prepared, Smooth Surface, 2 and 3 ply, Stone Surface, Whitestone and Model, 2 ply), The Barber Asphalt Paving Co., Philadelphia, Pa.
Granite (Prepared), The Eastern Granite Roofing Co., 1 Hudson Street, New York, N. Y.
Huttig Rubber (Prepared, 2 and 3 ply), Barber Asphalt Paving Co., 1243 Stock Exchange Bldg., Chicago, for Huttig Mfg. Co., Muscatine, Iowa.
Indruroid (Prepared, 2 and 3 ply), H. F. Watson Co., Erie, Pa.
Malthoid (Prepared, 2 and 3 ply), The Paraffine Paint Co., Merchants Exchange Bldg., San Francisco, Cal.
Mastic (Prepared), National Mastic Roofing Co., San Francisco, and National Roofings and Materials Co., Edwardsville, Ill.

Mikado (Prepared, 2 and 3 ply), J. A. & W. Bird & Co., 35 India Street, Boston.
Monarch (Prepared, 2 and 3 ply), Stowell Mfg. Co., Jersey City, N. J.
No-Tar (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.
Paroid (Prepared, 2 and 3 ply), F. W. Bird & Son, East Walpole, Mass.
Protection Brand Asphalt Ready Roofing (Prepared), Asphalt Ready Roofing Co., 136 Water Street, New York.
Rex Flintkote (Prepared, 2 and 3 ply), J. A. & W. Bird & Co., 35 India Street, Boston.
Rhinoceros (Prepared, 2 and 3 ply), Warren Chemical and Manufacturing Co., 17 Battery Place, New York.
Roofrite (Prepared), The Lehon Co., W. 43rd Street, Lincoln to Robey, Chicago.
Rubber (Prepared, 2 and 3 ply), The General Roofing Co., East St. Louis, Ill.
Rubbertex (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.
Ruberoid (Prepared, 2 and 3 ply), Standard Paint Co., 100 William Street, New York.
Russelloid (Prepared, 2 and 3 ply), Russell & Dexter Co., Penn Yan, N. Y.
Safety (Prepared), National Roofing Co., Tonawanda, N. Y.
Security (Prepared), National Roofing Co., Tonawanda, N. Y.
Seneca (Prepared, 2 and 3 ply), Russell & Dexter Co., Penn Yan, N. Y.
Standard Asbestos (Prepared), H. W. Johns-Manville Co., 100 William Street,
Stowell's Slag (Slag), Stowell Mfg. Co., Jersey City, N. J.
New York.
Veribest Rubber (Prepared, 2 and 3 ply), McHenry-Millhouse Mfg. Co., South Bend, Ind.
Vulcanite (Prepared, 2 and 3 ply), The Patent Vulcanite Roofing Co., 625 S. Campbell Avenue, Chicago.
Walrus (Prepared, 2 and 3 ply), Warren Chemical and Manufacturing Co., 17 Battery Place, New York.
West Coast Ready Rock (Prepared), The West Coast Company, Waukegan, Ill.

SPRINKLERS, Automatic.

It has not been judged necessary as yet to extend label service to these devices.

The following patterns are approved:

Grinnell Improved 1903. General Fire Extinguisher Co., Providence, R. I.
International, Evans 1902 Model. International Sprinkler Co., 517 Arch Street, Philadelphia, Pa.
Manufacturers "C." Manufacturers' Automatic Sprinkler Co., 1-11 Liberty Street, New York.
Neracher Improved 1902. General Fire Extinguisher Co., Providence, R. I.
Niagara-Hibbard, issue B, 1904. Niagara Fire Extinguisher Co., Akron, O.
Phoenix, issue A, 1905. Phoenix Fire Extinguisher Co., 1028-33 First National Bank Bldg., Chicago.
Rockwood, issue A. Worcester Fire Extinguisher Co., 4 Arch Street, Worcester, Mass.

devices.

Grinnell Improved 1903. General Fire Extinguisher Co., Providence, R. I.
The following patterns are approved:

SPRINKLER SUPERVISORY DEVICES.

For use in connection with approved central station systems.
Consists of apparatus for transmitting signals when gate valves are closed or open; when water in tanks falls below or is restored to predetermined level; when pressure in air tanks falls below or is restored to predetermined amount;

when water in tanks falls below or rises above predetermined temperatures. Also apparatus for connection with water flow valves to transmit water flow signals (where there is a flow of water equal to that of one or more sprinklers) and to withhold signals from water surges or variable pressure.

A. D. T. Devices for attaching to Central Station Signaling Systems for supervisory maintenance and operation of sprinkler equipments. Manufactured by Automatic Fire Protection Company, New York and Chicago.

VALVES, ALARM. (See also Sprinkler Supervisory Devices.)

No appliances meeting all of the requirements desirable for this service have as yet been shown.

Ratings covering the patterns found in common use have been issued as follows:

Evans Variable Pressure 1902 model. Manufactured by International Sprinkler Co., 517 Arch Street, Philadelphia. Not standard. Field experience limited, but fairly satisfactory where device has been properly installed, correctly adjusted and intelligently supervised.

Grinnell English Pattern, Variable Pressure (Swing check for Straightway type). Manufactured by General Fire Extinguisher Co., Providence, R. I. Not standard. Field experience fairly satisfactory where device has been properly installed, correctly adjusted and intelligently supervised.

Grinnell branch (old type called Harkness Tee). Manufactured by General Fire Extinguisher Co., Providence, R. I. Not standard. Field experience, where central station and Local Board supervision obtains and valves are under constant pressure, reported as fairly satisfactory.

Manufacturers. Manufactured by Manufacturers Automatic Sprinkler Co., 1-11 Liberty Street, New York. Not standard. Field experience with an improved type of this valve in one locality, where central station and Local Board supervision obtains and valves are under constant pressure, reported as fairly satisfactory.

Niagara. Manufactured by Niagara Fire Extinguisher Co., Akron, O. Not standard. Field experience with an improved type of this valve in one locality, where central station and Local Board supervision obtains and valves are under constant pressure, reported as fairly satisfactory.

VALVES, DRY PIPE.

The following dry pipe valves are approved for use:

Grinnell Straightway. The General Fire Extinguisher Company, Providence, R. I.

International (No. 4 Evans Model), 4-inch size. International Sprinkler Co., Philadelphia, Pa.

Manufacturers, Model 3, 4-inch size. Manufacturers Automatic Sprinkler Co., New York, N. Y.

Rockwood, 4-inch and 6-inch sizes. Worcester Fire Extinguisher Co., Worcester, Mass.

Phoenix Mechanical, 5-inch size. Phoenix Fire Extinguisher Co., Chicago, Ill.

WATCHMEN'S TIME RECORDING APPARATUS.

Boxes for Central Station Systems.

Combined watchmen's Call and Fire Alarm Boxes for use in connection with approved normally closed circuit Central Station Watchmen's Time Recording Apparatus, constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels fixed to the outside of clock cases reading: *(See Cut No. 10.)*

The following companies are equipped to supply these devices:
American District Telegraph Co., 195 Broadway, New York.

Chicago Electric Protective Co., 147 Fifth Avenue, Chicago.
Signalphone Co., Milwaukee, Wis.
Viaduct Mfg. Co., 10 S. Howard Street, Baltimore, Md.

Apparatus for Local or Private Systems.

Watchman's Stationary Clocks constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of the Underwriters' Laboratories, Inc., have label fixed to outside of clock cases reading: *(See Cut No. 11.)*

and a decalcomania transfer is applied to the outside of the magneto cases reading: *(See Cut No. 12.)*

The following companies are equipped to supply these devices:

American Watchman's Time Detectors Co., 2069 Fourth Street, Cleveland, O.
American Watchman's Time Detectors Co., 234-5 Broadway, New York.
Eco Magneto Clock Co., 289 Congress Street, Boston.
E. A. Hamilton & Co., Grand Rapids, Mich.
E. O. Hausberg, 45 Maiden Lane, New York, N. Y.
Holtzer-Cabot Electric Co., Brookline, Boston, Mass.
E. Howard Clock Co., 373 Washington Street, Boston, Mass.
Newman Clock Co., (Single Station Clock), Masonic Temple, Chicago.
Simplex Time Recorder Co., Gardner, Mass.

Before the extension of the label service to this industry approvals were granted to certain clocks manufactured by the foregoing and other companies as follows:
Indianapolis Magneto. Indianapolis Watchman Clock Co., Indianapolis, Ind.
Wakeman's Single Station. Wakeman's Time Recorder Co., Scranton, Pa.

Portable Clocks.

Watchman's Portable Clocks constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels fixed to the inside of clock cases reading: *(See Cut No. 11.)*

and a decalcomania transfer is applied to outside of the key boxes reading: *(See Cut No. 12.)*

The following companies are equipped to supply these devices:

Eco Magneto Clock Co., 289 Congress Street, Boston.
Hardinge Bros., 1034-1036 Lincoln Avenue, Chicago.
E. O. Hausburg, 45 Maiden Lane, New York.
Nanz & Co., 127 Duane Street, New York.
Newman Clock Co., Masonic Temple, Chicago.
The Timekeeper Co., Chicago.

Before the extension of the label service to this industry approvals were granted to certain clocks manufactured by the foregoing and one other company as follows:

New York. Manufactured by J. Schlenker, Germany, for The General Watchman's Time Detectors Co., New York.

WINDOWS.

Metallic Window Frames and Sash glazed with Wired Glass, constructed in accordance with National Fire Protection Association specifications, and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels riveted to the inside of the window reading: *(See Cut No. 13.)*

The following companies are equipped to supply these devices. Members are advised to give preference to windows which bear the labels referred to.

Allegheny, Pa., Allegheny Cornice & Skylight Co., 821 Bouquet Street.
Double Hung.

Boston, E. B. Badger & Sons Co., 63 Pitts Street. Double Hung, Stationary.
Brooklyn, Herrmann & Grace, 671-685 Bergen Street. Pivoted Upper Sash.
Chicago, Grace Cornice Works, 1260 Indiana Avenue. Double Hung.
Chicago, Illinois Roofing & Cornice Co., 329 W. Kinzie Street. Double Hung, Pivoted Upper Sash.
Chicago, Harry C. Knisely Co., 273 S. Canal Street. Double Hung, Pivoted Upper Sash, Pivoted Upper and Lower Sash, Swing Pivoted Sash, Stationary, Top Hinged, Pivoted Lower, Top Hinged Upper and Stationary Lower.
Chicago, Knisely Bros., Fifth Avenue and 28th Place. Casement, Double Hung, Pivoted Upper Sash, Stationary, Pivoted Upper and Lower, Top Hinged, Single Pivoted.
Chicago, J. C. McFarland & Co., 27th Street and Fifth Avenue. Double Hung, Pivoted Upper Sash, Pivoted Upper and Lower Sash, Fixed Upper and Pivoted Lower Sash, Single Pivoted, Top Hinged, Stationary Lower and Top Hinged, Upper Sash Stationary.
Chicago, Jas. A. Miller & Bro., 129 S. Clinton Street. Double Hung, Pivoted Upper Sash.
Chicago, Perkinson & Brown, 111 N. Lincoln Street. Pivoted Upper Sash.
Chicago, E. A. Rysdon & Co., 627-629 W. 41st Street. Double Hung, Pivoted Upper Sash.
Chicago, Sykes Steel Roofing Company, 112-120 W. 19th Place. Double Hung, Pivoted Upper Sash.
Chicago, Voigtmann & Co., 42-54 E. Erie Street. Pivoted Upper Sash, Pivoted Lower, Pivoted Upper and Lower, Single Pivoted, Double Hung, Top Hinged, Top Hinged Upper and Stationary Lower and Stationary.
Cincinnati, Jacob Freund Roofing Co., B. & O. S. W. Ry., near Mitchell. Pivoted Upper Sash.
Cincinnati, Thomas Lee, 128 W. Second Street. Double Hung, Pivoted Upper Sash.
Cincinnati, Witt & Brown, 215 W. Third Street. Pivoted Upper Sash, Pivoted Upper and Lower.
Cleveland, Riester & Thesmacher Co., 1514-1526 W. 25th Street. Pivoted Upper Sash.
Kansas City, J. A. Ritzler Cornice & Ornament Co. Double Hung.
Kansas City, Henry Weis Cornice Co., 1811-1815 Wyandotte Street. Pivoted, Double Pivoted, Single Pivoted, Stationary, Double Hung.
Kansas City, Zahner Mfg. Co., 12 West 10th Street. Double Hung, Pivoted Upper, Pivoted Upper and Lower and Single Pivoted.
Milwaukee, Wis., Biersach & Niedermeyer Co., 216-220 Fifth Street. Pivoted Upper Sash, Pivoted Lower, Pivoted Upper and Lower, Single Pivoted and Stationary.
Milwaukee, Wis., Consolidated Sheet Metal Works, 661-673 Hubbard Street. Double Hung, Pivoted Upper, Pivoted Upper and Lower, Single Pivoted, Stationary and Hinged.
New York, J. F. Blanchard Co., Broadway and 23d Street. Double Hung.
New York, Voigtmann & Co., 427 W. 13th Street. Pivoted Upper Sash, Double Hung.
New York, M. F. Westergren, Inc., 213-221 E. 144th Street. Pivoted Upper Sash.
Pittsburg, Pa., S. Keighley Metal Ceiling & Mfg. Co. Double Hung.
Philadelphia, David Lupton's Sons Co., Allegheny Avenue and Tulip Street. Casement, Double Hung, Pivoted Upper Sash, Pivoted Upper and Lower Sash, Single Pivoted, and Stationary.
Philadelphia, J. S. Thorn Co., 20th and Allegheny Avenue. Double Hung, Pivoted Upper Sash, Casement.
Salem, O., W. C. Mullins Co. Double Hung, Pivoted Upper Sash, Pivoted Lower Sash, Pivoted Upper and Lower Sash, Single Pivoted, Stationary.
St. Louis, Eagle Metal Works Co., 1510-1512 Clark Avenue. Double Hung.
St. Louis, Hopmann Cornice Co., 2571-2573 Benton Street. Double Hung.
St. Louis, Mesker & Bro., 421-519 S. Sixth Street. Pivoted, Double Pivoted, Single Pivoted, Double Hung, Stationary and Casement.
St. Louis, Powers & Boyd Cornice and Roofing Co., 3614-3616 Laclede Avenue. Double Hung.

St. Louis, Ruth Cornice Works, 4298 Page Avenue. Double Hung.
St. Louis, Von Der Au & Cluss Mfg. Co., 2404-2408 South Jefferson Avenue. Double Hung.

WINDOWS, Hardware.

Sash Locks.

Malleable iron locks examined at factory and passed by Underwriters' Laboratories' Inspectors have attached to each box of twelve locks, sealing the box, label reading as follows: *(See Cut No. 14.)*

The following manufacturer is equipped to supply these devices. Members are advised to give preference to the locks which bear the label referred to.

Chicago, Payson Manufacturing Co., 1319 Jackson Boulevard.

Sash Locks.

Malleable iron locks examined at factory and passed by Underwriters' Laboratories' Inspectors have attached to each box of three locks, sealing the box, label reading as follows: *(See Cut No. 15.)*

The following manufacturers are equipped to supply these devices. Members are advised to give preference to the locks which bear the labels referred to.

New Haven, Conn., The H. B. Ives Co., 11-17 Artizan Street.
Philadelphia, Pa., Jas. Peters & Son, 1934-1938 North Front Street.

Sash Chains.

The following sash chain in sizes Nos. 80, 100, 130 and 250, has been examined and tested and is approved for use on metallic window frames and sash with wired glass as follows:

Size No. 80 for sash weighing not more than 90 pounds.
Size No. 100 for sash weighing not more than 120 pounds.
Size No. 130 for sash weighing not more than 160 pounds.
Size No. 250 for sash weighing not more than 210 pounds.

Community Guaranteed Sash Chain. Oneida Community Limited, Oneida, New York.

WIRED GLASS.

It has not been judged necessary to extend label service to this material up to the present time. Distinctive marks applied by the companies themselves to that portion of their product constructed in accordance with the standard (without constant supervision of such marking by the Laboratories) has been considered acceptable.

New York, N. Y. Mississippi Wire Glass Co.
This company claims exclusive right to the use of hexagonal mesh in wired glass. Decision of the Court of last resort on this claim is not yet obtained. In the meantime sub-standard wired glass using hexagonal mesh is occasionally found on the market. Members should therefore make careful inspection of this type of product before acceptance.

Philadelphia, Pa. Continuous Glass Press Co.
Marking: Consists of a strand of the wire mesh made by twisting two No. 27 gage wires together, and spacing such distinctive cabled strand approximately 10 inches apart in each sheet of glass manufactured.

Streator, Ill. Western Glass Co.
Marking: Consists of five loops at each vertical strand of wire mesh.

Pittsburg, Pa. Arbogast-Brock Glass Co.
Marking: A U-shaped piece of wire, 3-16 of an inch in height, embedded near one corner or spaced about 15 inches apart vertically and horizontally in each light.

W. H. MERRILL, *Secretary.*

Committee Reports.

EXECUTIVE COMMITTEE.

Meeting Held August 5, 1908.

Following the action of the Association taken at recommendation of Committee on Fire-Proof Construction, E. T. Cairns, Chairman, covering the appointment of a Conference Committee on Building Code, and referring also to invitation of the National Board of Fire Underwriters, as expressed through recommendation of its Committee on Building Code, adopted at the annual meeting of the National Board, the following Conference Committee was appointed:

E. T. Cairns, Chairman,

Gorham Dana,	C. A. Hexamer,
W. C. Robinson,	E. B. Creighton.

Uniform Requirements. This matter being referred to the Executive Committee by the vote of the Association, it was voted to defer action pending an opportunity to receive report of Conference Committee on Building Code.

Automobile Garages. This matter being referred to the Executive Committee by the vote of the Association, it was voted to defer action pending an opportunity to receive report of Conference Committee on Building Code.

Appropriations. Resolved that a sum not to exceed $500 be appropriated to be expended under the direction of the president for bringing the work of the Association and the benefits to accrue from following its suggestions as to the reduction of the fire waste more fully to the attention of the public.

Resolved that following the custom of past years expenditures for the work of Special Committees if the same be in excess of $10 shall not be made except under the authority and with the approval of the Executive Committee.

Resolved that the Secretary be and is hereby requested to furnish to each member of the Committee a schedule showing the status of every Committee of the Association on the following particulars, viz.:

Name of the Committee,

When appointed.

Reference to all reports made by such Committee showing the pages of the Annual Reports on which they may be found, if such was a final or progress report, so far as practicable an enumeration of the matters that are still open in such Committee, and such other information as the Secretary may consider pertinent and feasible; and further, the Secretary is hereby authorized to include in the next annual report of the Association an index to the previous work done by Committees along the lines above set forth.

Resolved that the Secretary be and is hereby requested to pro-

mulgate to members a general index to printed matter which has been issued by the Association.

Elected Active Member. The National Hardware Association of the United States.

Special Committees. Special Committees for the ensuing year were appointed as per list and printed in directory at present going forward, the principal changes being as follows:

E. P. Boone, Chairman, Committee on Automatic Sprinklers, in place of E. U. Crosby, resigned.

F. W. Jenness,
W. G. Sanderson,
T. Z. Franklin,
J. M. Hughes,
J. R. Sullivan,
E. A. Northey,

added to the Committee on Devices and Materials.

E. B. Creighton and W. W. Dudley, resigned.

Ralph Sweetland, Chairman Committee on Signaling Systems, in place of C. M. Goddard, resigned.

Name of the Committee on Special Hazard and Fire Record changed to Committee on Manufacturing Risks and Special Hazards. W. D. Grier appointed Chairman in place of H. A. Fiske, resigned.

The following committees are discontinued owing to work being finished:

Car Houses,
Matches,
Roofs and Roofings.

New Committees. Gravity Tanks, Gorham Dana, Chairman; Grain Elevators, J. V. Parker, Chairman.

Annual Meeting of the Association. Voted to be held in the City of New York, May 25, 26 and 27, 1909.

W. H. MERRILL, *Secretary.*

COMMITTEE ON DEVICES AND MATERIALS.

Meeting Held August 6, 1908.

Following discussion, actions were taken on the following Laboratory Reports, the details of which will go forward by individual bulletins and be found in the card wordings:

Retardants. Nos. 281, 237 (amended), 278, 188 (amended), 180—all after the first sentence, section 12 stricken out and card wording approved, 158 (no change), 130 (no change), 277 (no change), 239 (insert the words "sufficient thickness").

Signals. No. 94. Sub-committee report recommending no action at present time, pending further investigations adopted.

Extinguishers.

No. 239. (Laboratory recommendations adopted.)
No. 219. (Card wording amended.)
No. 225. (Card wording changed.)

Alarm Valves Ext. 24. Voted to appoint Special Committee of five.

Unlined Linen Hose. Voted to recommend against restrictions in hose lengths and sizes.

Wood for Fire Doors. Voted to recognize cypress and red wood.

Wood Stave Pipe for Fire Protection. Voted to appoint a Special Committee of three to investigate and report.

W. H. MERRILL, *Secretary.*

COMMITTEE ON HOSE.

In response to our request for a Progress Report the Chairman writes as follows:

"At the last annual meeting of the National Fire Protection Association this Committee asked that the subject of specifications for fire department hose be referred back for further investigation and conference with the manufacturing interests. This request was granted and the Executive Committee empowered to act upon the Hose Committee's report.

We can now report that our work has been completed and the report and specifications turned over to the Executive Committee.

The Committee feels that it would be well to now take up the special feature of hose for high pressure service as this is daily becoming of greater importance."

H. W. FORSTER, *Chairman.*

COMMITTEE ON PIPE.

According to the understanding of the Chairman the American Water Works Association do not differ materially from the New England Water Works Association as to standard for cast-iron pipe. But it seems that the American Water Works Association more nearly fits the existing patterns in the field, and the New England Association is inclined to think that the patterns should be changed or improved to fit the New England standard. Further information as to this situation can probably be obtained after the Convention at Atlantic City, September 23d to 25th, which the Chairman hopes to attend. It is hoped that the officials of each of the Water Works Associations may appoint a joint committee on Pipe Standard, so that something definite may be accomplished. The Chairman thinks that some sort of a compromise is more important than mere details and that manufacturers will be very unlikely to change the patterns so long as they can sell pipe from patterns now used.

ALBERT BLAUVELT, *Chairman.*

COMMITTEE ON STANDARD HOSE COUPLINGS AND HYDRANT FITTINGS FOR PUBLIC FIRE SERVICE.

In response to our request for a Progress Report the Chairman writes as follows:

"It may be of interest to readers of 'The Quarterly' to note that

the writer in company with two other members of this Committee attended the Annual Meeting of the International Association of Fire Engineers at Columbus, Ohio, August 25th to 29th inclusive. We take pleasure in stating that the members of the above Association continue to give evidence of deep interest in the subject under charge of this Committee. The following remarks were addressed to the members present on the floor of the meeting and were well received:

Mr. President and Gentlemen of the International Association of Fire Engineers:

Believing that it will possibly prove of some interest to you to learn what has been accomplished in an attempt to secure the adoption of standard couplings for hydrants and hose, it affords us much pleasure to advise you that since the adoption of this standard by your Association the Committee having its promotion in charge has strenuously labored to extend the field of its acceptance and in accomplishing what has been secured we have endeavored to reach the Boards and most influential bodies of public character, and in that effort have addressed letters to something like fourteen hundred Boards of Trade and Chambers of Commerce throughout the United States from whom we have had numerous and encouraging replies, many of them taking up the matter not only as relating to their own locality but to those within helping distance of their vicinity. In addition to these letters we have had the pleasure of addressing three hundred Chiefs of Departments in cities of twenty thousand population or over, and from these communications we received approximately one hundred replies of which something over fifty per cent., we are pleased to say, advised us of the adoption and use of the standard. This is very encouraging because we feel that through the efforts of the organized fire departments lies our strongest hope of final success in the adoption of this very essential element in fire fighting utilities. We very highly appreciate the hearty co-operation and valuable assistance rendered to us by the members of this organization. In addition to the response had from chiefs and others directly in answer to our communications we are reliably advised that something over one hundred cities and towns have already adopted the standard and we might cite among those of considerable importance the following:

Anderson, Ind.	New Brunswick, N. J.
Binghamton, N. Y.	Norwich, Conn.
Battle Creek, Mich.	St. Louis, Mo.
Elgin, Ill.	Sacramento, Cal.
Grand Rapids, Mich.	San Francisco, Cal.
Kalamazoo, Mich.	Seattle, Wash.
Los Angeles, Cal.	Taunton, Mass.
Milwaukee, Wis.	Trenton, N. J.

Doubtless, while this list of one hundred and odd shows a very decided progress in the standardization of hose couplings, it is doubtless true that there are many cities throughout the country where standardization has been accomplished of which we have not been advised, and it would seem proper to suggest to the members of this organization, if agreeable to their very worthy Secretary, Mr. McFall,

that the chief from each city where such changes have been made, or where the standard couplings of 7½ threads to the inch and 3 1-16 inches outside diameter are now in use so advise him that the records may be completed.

In lieu of the complete adoption of the standard we are pleased to say that in many instances, where conditions prevented such method, the interest in conforming to the standard as nearly as possible has permitted many Chiefs of Departments to add to their equipment adapters having the local thread on one side and the standard thread on the other, whereby they may for the time be able to render assistance or secure aid through those who have already adopted the standard, and if this Committee may be permitted it would like to suggest, with commendation, the use of adapters where the standardization cannot be immediately accomplished. We are particularly pleased to come before you at this time and to be able to report such satisfactory progress in a matter which is of such vital importance to each fire department, not only for its individual needs but in that broader measure which covers not only our willingness but our ability to help our brother when in need. This, gentlemen, can only be accomplished satisfactorily when all fire fighting apparatus is so standardized as to be interchangeable between cities and towns when the call is made for them. We trust that this body may be enthused as we are over the success of standardization and lend themselves willingly and earnestly to furthering its progress and if in such effort any member of the organization feels that this Committee may be of assistance to him in any respect we gladly offer our services at any time and in any manner and we shall be glad to hear from you."

It is also interesting to note the disposition of this Association as regards the adoption and use of the National Standard Hose Couplings and Hydrant Fittings as evidenced by the following resolutions which were introduced by the "Committee on Resolutions" and were unanimously adopted by the Association:

"WHEREAS, This Association was among the first of the National Associations of importance to approve and to adopt the National Standard hose coupling, having 7½ threads per inch and having an outside diameter of 3 1-16 inches, and

WHEREAS, the standard thus adopted is identical with that which was suggested and promulgated by this Association in convention assembled in 1873, at which time the proposer, Chief Hill, of the Cleveland Fire Department, expressed the hope that thus might be accomplished a standard which would permit a line of hose to be stretched from ocean to ocean, and it now appearing that this standard is being rapidly adopted and installed through the country,

BE IT THEREFORE, *Resolved*, That it is the belief and opinion of the members of this convention that great benefit will result from the further and complete installation of the National Standard Hose Couplings and Hydrant Fittings throughout the land and that therefore, each and every member of this Association should use his utmost endeavors to further this end in his own city and in all adjacent towns and cities contributory to the same."

F. M. GRISWOLD, *Chairman.*

COMMITTEE ON THEATRE CONSTRUCTION AND EQUIPMENT.

In response to our letter asking for a Progress Report the Chairman writes as follows:

"It is my opinion that the work of this Committee is practically completed and my request at the last Annual Meeting for the continuance of the Committee was only for the purpose of having a standing committee that would watch the development of the improvements in theatre construction and would report same to the annual meetings. In adopting the Theatre Section of the National Board Building Code the National Fire Protection Association is on record as to theatre construction. The detail specifications for construction of asbestos curtains and the preliminary specification for steel curtains are also on record. It remains then for the Committee to watch developments in this line and to recommend at some future time the adoption by the Association of a theatre curtain standard. The Committee must also give consideration to the question of openings in roof over stage and at some future time recommend to the Association for adoption a standard construct for automatically opening roof skylight. The Committee will of course keep in touch with the question of revision of building code."

C. A. HEXAMER, *Chairman.*

The following Committees have no report to make at this time:—Artificial Refrigeration, Automobile Garages, Automatic Sprinklers, Concrete and Reinforced Concrete for Building Construction, Fire-Proof Construction, Fire Protection Coverings for Windows and Door Openings, Hydrants and Valves, Pneumatic Conveyors of Stock and Refuse, Private Fire Supplies from Public Mains, Pumps, Signalling Systems, Manufacturing Risks and Special Hazards, Uniform Requirements, Gravity Tanks and Grain Elevators.

Paint and Varnish Factories---Fire Record.

Total Number of Fires, 95.

This class includes the following:—Paint Works, 47 fires; Dry Color Works, 9 fires; Varnish Works, 15 fires; Printers' Ink, 16 fires; Wood Finish, 2 fires; Stove Polish, 3 fires; Shoe Blacking, 3 fires.

1. CLASSIFICATION OF CAUSES.

Common Causes.

LIGHTING. Number of fires, 3.
Employee dropped lantern down elevator boot.
Short circuit in electric light caused sparks to drop into an open barrel of coloring.
Open electric light sparked and ignited combustible material.
HEATING. Number of fires, 1.
Too much coal put on furnace when left for the night.
POWER. Number of fires, 1.
Poor insulation of electric wires.
BOILER (or fuel). Number of fires, 3.
Smoke-stack coming in contact with woodwork.
Heat from boilers ignited barrels of dry color.
Spontaneous combustion of soft coal.
RUBBISH (or sweepings). Number of fires, 7.
Spontaneous combustion of rubbish or sweepings, 7 fires.
OILY MATERIAL. Number of fires, 5.
Spontaneous combustion of oily overalls.
Spontaneous combustion of oily waste used to clean shafting.
Spontaneous combustion of oily rags and material, 3 fires.
SMOKING. Number of fires, 1.
Cigarette thrown on floor.
LIGHTNING. Number of fires, 2.
LOCOMOTIVE SPARKS. Number of fires, 0.
MISCELLANEOUS. Number of fires, 0.

Special Hazard Causes.

ROSIN BOILING. Number of fires, 7.
Boiling rosin, tank cracked and contents fell into fire, igniting and setting fire to woodwork.
Tank for boiling rosin cracked on bottom and contents ran down into furnace.
Rosin boiled over and was ignited from boilers on floor below.
Flash fire from rosin still.
Employee opened tap of rosin still causing a flash fire.
Overheating of rosin in one of the pans.
Overheated rosin still.

VARNISH BOILING. Number of fires, 10.

Overheating of varnish still, 5 fires.

Overheating of oil in kettle.

Kettle of varnish boiled over and flames communicated to several kettles.

Pot of varnish boiled over.

Explosion due to ignition of varnish vapors.

Flue from varnish still burning out set fire to varnish which had collected on outside of same.

GUM GRINDING. Number of fires, 1.

Foreign substance in gum grinding machine caused spark igniting gum.

DRY COLOR GRINDING. Number of fires, 3.

Foreign material in dry color (chemically pure green) passing through grinder, caused air explosion.

Spark from nail passing through mill. Mill was grinding cheap green stock.

Caused by dry color grinding mill.

COLOR DRYING. Number of fires, 6.

Spontaneous ignition of chrome green pigment in dryer.

Overheating of dry room caused spontaneous combustion in color.

Overheating of colors spread out to dry on manila paper. Dry room hot air heated.

Woodwork in contact with steam pipes in dry room.

Unknown in dry room, 2 fires.

PAINT GRINDING AND MIXING. Number of fires, 2.

Friction in paint grinding machine.

Occurred in paint mixer.

IGNITION OF VAPORS FROM PAINT, VARNISH, ETC. Number of fires, 10.

Watchman carried open light near tank of cooling varnish which ignited vapor.

Ignition of tank of varnish by open light.

Vapor from heated varnish ignited from fires used in boiling varnish about 40 feet distant.

Ignition of empty varnish barrel.

Experimenting with varnish reducer when volatile gases were ignited by an open light.

Explosion of vapor from paint and varnish.

Unknown at varnish tank.

Watchman passing japan tanks with lighted lantern which ignited vapor.

Caused by a japan mixture, vapor ignited.

Explosion of alcohol vapor in a hogshead.

SPONTANEOUS COMBUSTION OF PAINTS, DRY COLOR, AND LAMP BLACK. Number of fires, 9.

Spontaneous combustion in dry color in storage.

Spontaneous combustion in dry colors (chrome green, chencac blue and lampblack).

Unknown in barrel of dry color.

Explosion of keg of pigment from unknown cause.

Spontaneous combustion in zinc white.
Spontaneous ignition of chrome green in barrel.
Spontaneous combustion in barrel of lampblack.
Spontaneous combustion of lampblack.
Spontaneous combustion of mixed paints.

GASOLENE. (Cleaning, etc.) Number of fires, 3.

Employee cleaning mixing machine with gasolene struck match for light.
Spark ignited can of gasolene, probably caused by smoking.
Explosion of gasolene caused by an employee smoking.

MISCELLANEOUS. Number of fires, 7.

Steam-jacketed kettle containing turpentine and oil flashed from unknown cause.
Pot of tallow boiled over on gas stove.
Explosion of one burner "Florence" K. O. stove used for heating shoe dressing.
Burners left turned on gas stove for heating blacking.
Ignition of blacking by hot soldering iron.
Fire occurred in an enamel strainer.
Heating wood alcohol and rosin over stove.
Compound boiled over and ignited.

Summary.

Common Causes.

	No of Fires.	Per Cent. of Whole.
Lighting	3	3.7
Heating	1	1.2
Power	1	1.2
Boiler (or fuel)	3	3.7
Rubbish (or sweepings)	7	8.7
Oily Material	5	6.2
Smoking	1	1.2
Lightning	2	2.5
Locomotive Sparks	0	.0
Miscellaneous	0	.0
Total	23	

Special Hazard Causes.

Rosin Boiling	7	8.7
Varnish Boiling	10	12.3
Gum Grinding	1	1.2
Dry Color Grinding	3	3.7
Color Drying	6	7.4
Paint Grinding and Mixing	2	2.5
Ignition of Vapor from Paint, Varnish, etc.	10	12.3

	No. of Fires.	Per Cent. of Whole.
Spontaneous Combustion of Paint, Dry Color and Lampblack	9	11.1
Gasolene	3	3.7
Miscellaneous	7	8.7
Total	58	
Common Causes	23	28
Special Hazard Causes	58	72
Total	81	
Incendiary	1	
Exposure	1	
Cause Unknown Fires	12	
Total Paint and Varnish Factories Fires	95	

2. DETAILS OF CAUSES.

Common Causes.

H-1028. In filling can with thinned paint, paint is of course scattered over the floor, at night this paint is removed by sprinkling paraffine over same and then mopping it up. The mops after being squeezed as dry as possible are placed in a large metal can and shoved under a bench. Spontaneous combustion is supposed to have set fire to mops. Fire spread under bench to open space in corner of room.

Special Hazard Causes.

H-49. The fire started at the gum mill, suddenly, in the presence of the workmen, there was a slight explosion and fire seized the woodwork spreading so rapidly that the employees had to leave. The consensus of opinion of those best able to judge is, that some foreign substance got into the mill and that a spark caused by friction ignited the gum dust and the gum in and immediately about the mill. Mill is to be removed from the building and placed in a fire-proof room.

H-86. The watchman at this plant usually carries a small electric battery light, two of which are left in the office. The batteries having run down, and no new ones having been obtained, he was obliged to carry an ordinary lantern. He is instructed to turn on the steam in the morning throughout the plant. In the thinning room are two rectangular air tight cooling tanks located on an iron platform (varnish after being thinned is left in these tanks until cool when it is then pumped to storage tanks). For some unaccountable reason, supposedly to look for steam pipes, the watchman went up to these tanks and opened the cover of one. The vapor ignited from his lan-

tern. Instead of closing the cover of the tank the watchman ran to the box and turned in an alarm.

H-407. The cause of the fire is supposed to have been from the vapor of heated varnish which was being put into cooling tanks in the cooling room, taking fire from the fires used in boiling the varnish. Said fires were about 40 feet distant from where the heated varnish was being handled. The recurrence can be prevented by bricking up the direct communication between the cooling room and the room where the fires are used for boiling the varnish.

H-1361. Fire occurred about 2 p. m., Wednesday, October 17th, in the unsprinklered varnish, mixing and pressing house. This is a one-story brick building, 53x25 feet, divided into two nearly equal sections by a 12 inch brick division wall with a poor iron clad fire door at opening. Roof, boards on joist, iron covering; ceiling, iron clad. There were two heavy glass skylights (about 5x2 feet each), metal frames in each section. Concrete floor; walls, open finish. Several light glass windows in each section at front of building facing yard; also a doorway in varnish boiling section. Balance of walls blank, except for the one opening between sections, as above.

There are no lights in building. There was an electric motor; but no current on same at time of fire. A small hot water heater or furnace stood in one corner of the boiling section. It was enclosed in wood; enclosure said to be tight, had a wooden door shut at the time. There was a little fire in this heater.

An open iron kettle containing about 150 gallons of varnish had been moved to the doorway between the two sections. Varnish had been allowed to cool for some time. Assured estimate about an hour.

Assured claim they had extinguished the fires used for boiling the varnish (as is their custom) before thinning was begun. A small amount of turpentine, say 15 gallons, had just been used as a thinner, and workmen were pumping benzine into the varnish by means of a hand pump, when the material took fire and there was an explosion raising the roof of the boiling section about eight inches and bulging a part of wall of the press section. The skylights were blown out, also the windows. The fire practically destroyed the roof of the press or storage section and there is damage to varnish and other tanks here.

It is thought fire was caused by the vapor from the benzine creeping along the floor from the thinning kettle to the furnace, and then flashing back to the kettle. Distance 13 feet from kettle to furnace.

S-1812. Fire apparently started in a barrel containing ground green color. This color is a mixture of Prussian blue and chrome yellow. They are mixed wet then dried. The grinding of the dried color is done in this room. The barrel in which the fire started was located near the grinder. No grinding or other work had been done in this room for over an hour before fire started. It is stated that this green being a mixture of Prussian blue, which contains a large amount of carbon, and chrome yellow, which contains a large amount of oxygen, may ignite spontaneously when dry. This action would probably be accelerated by the presence of oil or other foreign matter.

H-1907-A. Workmen were mixing zinc white with oil, when barrel of dry zinc white was discovered to be a glowing mass in the center, and when cooled off with water it was found the zinc white had been melted back to the original metal. Zinc white is an oxide of zinc prepared by sublimation and combustion of the metallic zinc. In this process some of the zinc does not oxidize completely, and under right conditions this oxidation will continue and sometimes is so rapid that the mass will become ignited. This hazard is well known in plants preparing zinc white, but in the paint factory visited the foreman reports this as his first experience in 20 years. Zinc white should be stored in separate building from the main plant and this is done at this plant.

H-2176. This plant comprised a one-story brick main building, 40x40 feet, with a detached building of corrugated iron construction, occupied as the boiler house and boiler room; the rooms separated by a fire door. The oil boiling kettle rested on a brick furnace, coke being used for fuel. The fire was caused by the overheating of the oil in the kettle during the temporary absence of the man in charge. The fire spread rapidly preventing any access to the employees in their efforts to extinguish it. The boiling house had no vent or stack and the door leading to the boiler room was open at the time the fire started. The fire extended to the boiler house and would have communicated to the main building but for the arrival of the firemen, whose quick work saved the latter building.

S-2533. Supposed that match was carelessly thrown upon the floor igniting empty barrel which had been filled with varnish.

H-2800. There was a large amount of naphtha used in the manufacture of this stove polish. The main supply was outside of building in 1,000 gallon underground tank. That used in process caused several serious explosions injuring many firemen.

S-3719. Foreign material in dry color (chemically pure green) passing through grinder caused an explosion.

S-4471. While heating a varnish reducer in a steam bath, which was being experimented upon and contained a large percentage of benzine and alcohol, the volatile gases which were liberated were ignited by an open light in a kerosene oil stove in the room causing an explosion which shook the building.

S-4878. A tank containing about one barrel of varnish was being treated with slight steam heat and stirred with mechanical means. A Bunson burner was in use on a chemist's table about 20 feet away when cover of tank was removed and flash occurred.

S-4489. Barrel at north end of fifth floor partly filled with lampblack ignited spontaneously.

S-5178. Employee cleaning mixing machine with gasolene struck match to make further investigation, clothes caught fire and in endeavoring to put out fire, set fire to oil-soaked floors.

S-5187. Fire occurred in hot air heated iron dry box, unsprinklered, located in one-story room with brick walls open joist roof and cement floor at northeast corner of plant. Colors were spread out to dry on manila paper placed on slatted shelves. These shelves

are put in racks on iron trucks which are run into drying oven. Ovens are heated by hot air from blower system.

S-5448. Fire was discovered by one of the employees in dry box on first floor of building "C." This dry box is frame, metal-lined, and is used for drying mineral and chemical colors. The wet color is placed in frame slatted trays lined with paper and then put on metal and frame racks in dry box. The dryer is heated by steam coil on floor and Sturtevant blower system located in one-story frame sprinklered building adjoining. This fire is a good illustration of the ordinary dry box fires that have occurred from time to time and will continue to occur until automatic sprinklers are installed in them. There is no doubt but that the fire would have been drowned out in its infancy had this box been sprinklered.

S-5516. The first floor of this building is used for filling and soldering of cans, the mixing machine and supplies for mixing being in the second story. The blacking falls through a wooden tin-lined chute from mixer to a machine in first floor equipped with four cylinders, each having the capacity of one can. The cans are then passed to a soldering table close by where the soldering is done. The boy tending the machine neglected to remove the filled cans and started the machine, with the result that the contents of the four cylinders when released flew in all directions. Some of the blacking struck the soldering iron, and owing to the presence of benzine in the blacking, it immediately ignited. The boy was badly burned and was removed to the hospital. The fire spread from the first to the second story through the chute and ignited the material in the mixing machine, and also the 150 gallons of benzine in tank over machine, which is the supply for one mix. This tank is open at the top and is kept supplied for the next mix at all times, the contents being used about every five minutes. It is recommended that a hinged cover be put on the tank, held open by a fusible link, it being the purpose to smother any fire by the closing of the cover.

S-5938. Fire started in a 150 gallon hogshead mounted on trunnions, belted to shaft and used for cutting of shellac. Hogshead was filled with gum and denatured alcohol mixed in the following formula: 100 gallons grain alcohol; 10 gallons wood alcohol; one-half gallon of benzine. Several days before the fire hogshead began to leak and extra hoops were provided tightened by bolts and nuts. About 24 hours before the fire occurred hogshead was emptied and two workmen were putting on these new hoops when an explosion occurred in the hogshead setting fire to the surrounding woodwork. It appears that a spark caused by one of the wrenches ignited inside of hogshead through the open bung.

S-6049. Wax is melted in kettles over gas stoves in room partitioned off by frame partition metal-lined. The melted wax is then taken through openings fitted with self-closing shutters across building (about 40 feet) and poured into a steam-jacketed kettle, holding about 20 gallons of turpentine—a small amount of essential oil is also added. When mixture is thoroughly blended it is removed

from kettle and put in packages. The contents of one of these steam-jacketed kettles flashed from some unknown cause.

S-6229. Fire broke out inside a corrugated iron dryer 30x5½x6 feet in which a chrome green pigment, made from Prussian blue and chrome yellow, was drying. Dryer is heated by steam at one end and air is drawn to other end by a fan. The color is spread while moist onto a cloth-top frame in about two inch layers. These frames are piled on trucks and run into dryers. Dryer contained six full trucks and one empty one, about 300 racks of stock. Fire started in and near steam pipes (although superintendent says heat is never over 140°) and spread through dryer, also partially into another dryer. Superintendent had just been trying steam pump and steam was up and pump primed. Fire was fought and controlled by two hose streams and was almost out when apparatus arrived. The loss was confined to contents alone.

A fire very similar to this occurred in New York in a paint factory manufacturing the same kind of color, i. e.—chrome green from Prussian blue and chrome yellow. Prussian blue, or ferricferrocyanide; $Fe_4[Fe\ (C\ N)_6]_3$ contains about 24% of carbon and chrome yellow, or chromate of lead ($Pb\ Cr\ O_4$), contains about 20% of oxygen. These ingredients are mixed wet, then dried as described above and finally ground. Temperature of oven never goes above 140° and there is nothing of inflammable nature that enters into mixture. It is possible that bits of filter cloth might char and become ignited from some liberated oxygen from the lead chromate. This latter substance is a well-known oxidizer and will heat and ignite spontaneously in the presence of oils, etc. There may be certain conditions in which the carbon of one is acted upon by the oxygen of the ingredient, resulting in combustion.

The superintendent at works, a trained chemist and experienced in paint manufacture, states that he is baffled but is much interested and would like to discover an explanation.

S-6434. On Saturday morning a keg of dry pigment suddenly exploded from some unknown cause and the contents ignited. Fire was extinguished with a hand chemical before sprinklers could operate.

S-6436. Fire seems to have started from overheating a dry kiln. Sprinklers outside of kilns operated all right and held fire in check until arrival of the public fire department. This fire shows the necessity of sprinklers in dry kilns. Probably two or three sprinklers inside kilns would have taken care of fire with far less loss. Since fire sprinklers have been installed inside kiln, heads that opened were replaced and water turned on.

S-6438. At 10 a. m. a fire broke out in one of the paint grinding machines on the second floor of building No. 2. A tank of oil containing about a barrel was standing in front of the machine and took fire at once.

3. ROOMS IN WHICH FIRE OCCURRED.

	Special Hazards.		Common Causes.		Unknown Incendiary Exposure.		Total Fires.	
	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.
Storage and Non-Manufacturing ...	1	2	8	40	2	20	11	14
Boiler Room	..	..	4	20	1	10	5	6
Varnish Boiling	20	40	..	..	..	..	20	25
Drying Room	6	12	..	..	..	..	6	7
Mixing and Grinding	12	24	6	30	5	50	23	29
Filling Room	3	6	2	10	..	..	5	6
Storage Varnish and Japan	3	6	..	..	..	..	3	4
Storage Paint and Color	3	6	..	..	2	20	5	6
Blacking Mfg.	2	4	..	..	..	..	2	3
Total with data given	50		20		10		80	
No data	8		3		4		15	
Total	58		23		14		95	

4. DAY OR NIGHT. (Day Fires 6 a. m. to 6 p. m.)

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Day	33	60	6	29	6	50	45	51
Night	22	40	15	71	6	50	43	49
Total with data given	55		21		12		88	
No data	3		2		2		7	
Total	58		23		14		95	

5. PLANT IN OPERATION.

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Plant in operation	43	77	7	33	4	50	54	64
Plant not in operation	13	23	14	67	4	50	31	36
Total with data given	56		21		8		85	
No data	2		2		6		10	
Total	58		23		14		95	

6. HOW DISCOVERED.

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Employee	34	64	6	32	5	42	45	54
Watchman	10	19	2	11	6	50	18	21
Thermostat	1	2	1	5	..	..	2	2
Sprinkler Alarm.	6	11	3	16	..	..	9	11
Outsider	2	4	7	37	1	8	10	12
Total with data given	53		19		12		84	
No data	5		4		2		11	
Total	58		23		14		95	

SPRINKLER FIRE RECORD.

7. EFFECT OF SPRINKLERS.

	No. of Fires.	Per Cent. of Whole.
Extinguished or practically extinguished fire	45	73
Held fire in check	13	21
Unsatisfactory	4	6
Total	62	
No claim	35	56
Small loss	22	36
Large loss	5	8
Total	62	

8. DETAILS OF UNSATISFACTORY SPRINKLER FIRES.

7435. Philadelphia, Pa. January 14, 1898. Paint Factory. Fire occurred about 7 p. m. and was discovered by the watchman. Building was of brick, three stories with double floors on joists, open elevator and stairways.

Fire apparently started in closet on first floor in machine room there being a good sized belt hole almost directly over the closet. Second floor was occupied for storage of dry paints in barrels and mixing tanks. Third floor occupied for storage of dry colors. Fire seems to have passed by sprinklers up through the belt hole to the second floor, burning the ceiling over the second floor for quite a large area. Thirty-four sprinklers opened on the first floor, 70 on the second floor, and five on the third floor. Although the sprinklers were of considerable assistance they failed to properly hold the fire in check, probably because of fire obtaining considerable headway in closet and spreading up through belt hole. Sprinklers may have been slow in operating.

Risk was equipped with Walworth ordinary pendant sprinklers, spacing 8x12 feet under joists. Wet system, supplied by automatic steam pump, 70 pounds, and 5,500 gallon gravity tank. Spacing was somewhat defective and apparently some of the sprinklers did not operate properly.

Summary: Floor openings and defective sprinklers.

319. Chicago, Ill. February 16, 1899. Paint Factory. The fire apparently started from spontaneous combustion in oily waste and dirt under a small cupboard at one side of the open elevator shaft on the first floor. From the cupboard it communicated to a hanging rack above and to the ceiling of the first floor and along elevator guides to the upper floors, opening sprinklers on all five floors, 115 in all, and mostly near the elevator shaft. The elevator hatch covers failed to operate, probably through a failure in the electrical attachment. The battery cells were on a rack directly over fire on first floor and were cracked by fire but the system should have operated long before the fire gained headway enough to crack the cells.

The sprinklers opened satisfactorily but in all probabilities the first few heads were unable to reach all burning portions and after the small water supply was exhausted the fire rekindled and opened the remainder of the sprinklers. This is proved by the fact that most of the sprinklers did not throw water, the stock not being wet directly under them. It is reported that one of the sprinklers under a deck near where the fire started was throwing water when the fire department arrived. If this is so the piping must have been nearly empty. It would also indicate that fire was discovered not long after it rekindled. The joist was quite badly burned on first floor and called attention to the desirability of staggered spacing arrangement. A night engineer in an adjoining building smelled smoke two hours previous to the discovery of the fire but thought it was from a large warehouse fire which occurred in the neighborhood a few days before.

This equipment was a defective one consisting of Neracher sprinklers, dry system, with a 2,000 gallon pressure tank the only supply. The fire was probably more or less held in check until the tank was exhausted.

Summary: Defective water supplies.

6126. Chicago, Ill. May 25, 1907. Manufacturing Printers' Ink. When the fire department arrived no water was being delivered from the sprinklers and upon investigation the lieutenant of Insurance Patrol No. 2 found the system shut off; the valve at the base of the system riser was sealed shut. It had probably been closed at some time previous to the fire on account of accidental opening of a head in the second floor which showed signs on ceiling of having thrown water. As no heads were kept on hand by the engineer he probably shut off the system until he could obtain some and it was in this condition when the fire broke out. Fire was controlled by fire department with apparently little loss.

Summary: Water shut off.

6544. Camden, N. J. February 17, 1908. Varnish Works. Fire occurred at large varnish storage tanks and was held in check by the

sprinklers for some time but finally got beyond control. For further details see Quarterly No. 4, Vol. I, April 1908, page 144, Fire No. 6544.

Summary: Hazard too severe for sprinkler system as installed.

9. DETAILS OF LARGE LOSS SPRINKLER FIRES. (Where sprinkler control is satisfactory.)

6049. Cambridge, Mass. April 18, 1907. Manufacturing Shoe Dressings. Wax is melted over gas stoves and then poured into steam-jacketed kettles and turpentine added. One of these kettles took fire and the quick intense heat opened nearly all the sprinklers in the room, namely, 51. These held the fire in check but six hose streams were also used. Damage mostly by water.

Summary: Oil fire hard to extinguish.

6438. College Point, N. Y. January 17, 1908. Paint Factory. Fire occurred at one of the paint grinding machines and spread to a tank of oil containing about a barrel which was standing in front of the machine. Five sprinklers opened and held the fire in check but it took some 20 minutes to entirely extinguish it owing to the burning oil.

Summary: Oil fire hard to extinguish.

10. POINTS OF INTEREST FROM FIRE REPORTS.

Alarm Service.

S-5515. Door to thermostat test box found open, thus breaking circuit.

Concealed Spaces.

S-2764. Fire got between joists at sheathed ceiling of laboratory.

S-5187. Sprinklers had practically no effect in extinguishing fire for the reason that fire was inside iron drying oven which is unsprinklered and was kept there. This fire points out the advisability of installing sprinklers in drying ovens. Had they been so installed in this case the fire would probably have been extinguished before it had a start. As it was, the fire smouldered for several hours, heating the top to a red heat. The oven being about 30 feet long and six feet high and stock offering obstruction to hose streams from either end, it was several hours before fire was extinguished.

Construction.

S-394. Fire communicated from burning building across 18 foot alley on the north, through a belt box.

H-681. The rapid spread of fire in roofs with frame ventilators was again well illustrated, also the fire retarding and stopping of ordinary corrugated iron partitions on scantling which saved much damage in engine room and at storage and shipping rooms.

Cut-Offs.

H-2316. Fire originated in fourth story and spread over fire walls, extending only to fourth story of adjoining building, and to roof and attic of next building. Fire door between said to have been and apparently was closed. This shows weakness of such walls as cut-offs.

Fire Department.

S-5448. When firemen arrived they ordered valves controlling first and second floors of this section to be closed, claiming they could not work with the sprinklers operating.

Fire Doors.

H-908. Due to one or more quite serious explosions within the building the various fire doors seem to have been forced open, thus permitting the fire to communicate to the entire building which finally collapsed taking a great deal of the brick side walls down.

Some openings in these division walls were equipped with a fire door on one side of wall only which gave the force of the explosion a greater advantage to force the door open than would have been the case had every opening been provided with double doors, one of which would have been on the side next the explosion and thus had a greater advantage to withstand the shock.

Automatic Sprinklers.

S-1469. Fire started in small enclosure not equipped with sprinklers.

S-3171. Sprinklers operated not wholly satisfactory owing to heads being too close to joist practically pocketing water from each sprinkler. Fire was finally extinguished by streams from local hose.

S-4878. Two sprinklers practically extinguished the fire and considering that this should be classed as a varnish fire it is deemed worthy of special note that good execution was done, largely due no doubt to high water pressure.

11. NUMBER OF SPRINKLERS OPENED.

No. of Sprinklers Operating.	Extinguished Fire. No. of fires.	Extinguished Fire. Per cent.	Held Fire in Check. No. of fires.	Held Fire in Check. Per cent.	Unsatisfactory. No. of fires.	Total. No. of fires.	Total. Per cent.	No. of Sprinklers Operating.	No. of fires.	Per cent. of whole.
1	17	38	1	8	..	18	29	1	18	29
2	5	11	1	8	..	6	10	2 or less	24	39
3	7	16	..	..	..	7	11	3 or less	31	50
4	2	4	2	15	..	4	6	4 or less	35	57
5	..	..	1	8	..	1	2	5 or less	36	58
6 to 9 inc.	6	13	2	15	..	8	13	Less than 10	44	71
10 to 24 inc.	8	18	5	38	1	14	23	Less than 25	58	94
25 to 49 inc.	..	..	..	..	..	..	..	Less than 50	58	94
50 and over	..	..	1	8	3	4	6	50 and over	4	
Total	45		13		4	62				

Average number of sprinklers opened not including unsatisfactory, 6.5.

12. ALARM SERVICE.

	Satisfactory.		Failure.		Total.
	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	
Watchman alone	4	100	..	..	4
Sprinkler alarm alone	7	100	..	..	7
Thermostat alone	1	100	..	..	1

	Watchman.		Sprinkler Alarm.		Thermostat.		Total.
	Satisfactory.	Failure.	Satisfactory.	Failure.	Satisfactory.	Failure.	
Watchman and Sprinkler Alarm	6	3*	8	1	..	..	9
Watchman and Thermostats	..	1*	..	..	1	..	1
Sprinkler Alarm and Thermostats	..	..	1	..	..	1	1
Watchman, Sprinkler Alarm and Thermostats, ...	2	..	2	..	2	..	2

*These include fires where sprinkler alarm or thermostats notified the watchman.

Note.—These tables do not include fires where alarm service does or does not operate properly if fire is at once discovered by employee, the alarm service having no bearing on such fires one way or the other.

13. SECONDARY WATER SUPPLIES.

2764. Primary supply gravity tank nine pounds pressure. Second supply steam pump. Four sprinklers opened and pump was used to increase the pressure. The pump was probably of material assistance in controlling the fire.

5516. Primary supply gravity tank giving 39 pounds pressure. Second supply steam pump. Ten sprinklers opened and pump was used to increase pressure, the pump however was probably not much of a factor in controlling the fire.

7435. Primary supply automatic steam pump. Second supply 5,500 gallon gravity tank. One hundred twenty-five sprinklers opened and did not control the fire. Second supply was not a factor.

14. EFFICIENCY OF WATER SUPPLIES.

Primary Water Supply.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Water works,	15	25	58	8.0	73	27	0	61	51	0	3.8	19.7
Gravity tank,	11	18	23	4.8	55	36	9	27	18	25	1.7	9.5
Pressure tank,	27	45	86	5.2	89	7	4	86	86	70	5.1	5.5
Automatic pump,	7	12	73	10.0	43	43	14	75	72	70	8.7	11.3
Total,	60		66	6.4	73	22	5	71	51	55	4.6	12.4

15. EFFICIENCY OF WATER PRESSURES.

Pressure on Sprinklers.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Less than 15 lbs.,	2	3	9	5.0	0	100	0	0	9	0	.0	5.0
15 to 24 lbs. inclusive,	4	7	19	5.8	75	25	0	20	15	0	1.7	18.0
25 to 49 lbs. inclusive,	10	17	35	10.5	60	30	10	35	40	25	3.1	25.3
50 lbs. and over,	44	73	80	5.6	79	16	5	82	73	70	5.1	8.3
Total,	60		66	6.4	73	22	5	71	51	55	4.6	12.4

16. EFFICIENCY OF WET OR DRY SYSTEM.

Wet or Dry System.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Wet system,	33	55	56	5.5	64	30	6	62	45	48	2.3	12.3
Dry system,	27	45	78	7.3	85	11	4	80	70	70	6.6	13.0
Total,	60		66	6.4	73	22	5	71	51	55	4.6	12.4

Note—"Average number of sprinklers opened" does not in any case include the Unsatisfactory fires.

17. EFFICIENCY OF WATER SUPPLIES. As Regards Amount of Loss.

Primary Water Supply.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Water works,	15	25	58	8.0	33	53	13	60	61	45	1.4	7.3	28.0
Gravity tank.	11	18	23	4.8	45	45	9	28	18	25	1.8	7.8	.0
Pressure tank,	27	45	86	5.2	78	18	4	89	78	70	5.5	3.8	.0
Automatic pump,	7	12	73	10.0	57	29	14	80	60	70	9.3	11.5	.0
Total,	60		66	6.4	58	33	8	75	54	51	4.8	6.9	28.0

18. EFFICIENCY OF WATER PRESSURES. As Regards Amount of Loss.

Pressure on Sprinklers.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Less than 15 lbs.,	2	3	9	5.0	0	100	0	0	9	0	.0	5.0	.0
15 to 24 lbs, inclusive,	4	7	19	5.8	50	50	0	20	18	0	2.0	9.5	.0
25 to 49 lbs. inclusive,	10	17	35	10.5	40	40	20	33	40	38	1.8	9.3	51.0
50 lbs. and over,	44	73	80	5.6	66	27	7	85	73	63	5.4	6.1	5.0
Total,	60		66	6.4	58	33	8	75	54	51	4.8	6.9	28 0

19. EFFICIENCY OF WET OR DRY SYSTEM. As Regards Amount of Loss.

Wet or Dry System.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Wet system,	33	55	56	5.5	49	39	12	63	50	46	1.6	6.9	28.0
Dry system,	27	45	78	7.3	70	26	4	85	62	70	7.5	7.0	.0
Total,	60		66	6.4	58	33	8	75	54	51	4.8	6.9	28.0

Note—"Average number of sprinklers opened" does not in any case include the Unsatisfactory fires.

General Fire Record.

UNSATISFACTORY OR SERIOUS FIRES IN RISKS EQUIPPED WITH SPRINKLERS.

6905. Meriden, Miss. February 29, 1908. Cotton Seed Oil Mill. Fire occurred in large frame seed and hull house, part two-story, open joist construction. The second floor was used for storage of hulls. Fire occurred on second floor from unknown cause. The entire building was equipped with sprinklers but water was shut off at time of fire for some unknown reason. The seed and hull house was totally destroyed but other buildings were saved.

Summary: Water shut off sprinklers.

7453. Elberton, Ga. May 8, 1908. Cotton Mill. Fire occurred in dye house, probably incendiary. Water was undoubtedly shut off from sprinklers so they were of no service.

Summary: Water shut off sprinklers.

7451. Elberton, Ga. May 9, 1908. Cotton Mill. Fire occurred in cotton warehouse probably incendiary. Water was undoubtedly shut off from sprinklers so they were of no service.

Summary: Water shut off sprinklers.

7175. Dayton, Ohio. June 13, 1908. Metal Worker. At 6.15 p. m., during a heavy thunder-shower, lightning struck the oil house, a two-story building having brick walls, and roof and floors of reinforced concrete arches between iron I beams. There was a plank intermediate floor in the second story suspended from the roof. The second floor was used for the storage of supplies and the first was occupied by oil tanks, oil in barrels, etc. Benzine, gasolene, kerosene, alcohol, and turpentine were stored in tanks of 120 to 560 gallons capacity each in a pit under the first floor. There were 18 tanks of benzine holding 100 to 200 gallons each, on trucks on the first floor. This benzine was used for cleaning in the buildings and the tanks were nearly full. The building had been closed for the night. One of the employees witnessed the building as it was struck by lightning, which wrecked the roof and second floor walls. It seems probable that the lightning ignited the benzine vapor in the first floor and that the explosion was vented up through the open stairway. It is also probable that considerable damage to the building was caused by lightning as the roof and many bricks are said to be badly shattered. The first floor walls are bulged and cracked. As soon as the accident occurred the fire pumps were started and the mill fire brigade had two streams on before the arrival of the public department. In all, five hose streams were used. The building was equipped with automatic sprinklers, but the explosion at the beginning probably broke the pipes, thus making the sprinkler equipment of no use. A one-story oil house of reinforced concrete will be immediately built at a safe distance from the main buildings, and benzine and similar oils of an inflammable

nature will be stored in tanks buried in the ground outside the building. Loss, $5,844.

Summary: Explosion crippled sprinkler system.

7563. Buffalo, N. Y. July 16, 1908. Grain Elevator. This fire started on approximately the fifth floor of the stationary marine tower at southwest corner of Elevator A.

This building being of the ordinary heavy frame type of construction, with all corrugated iron exterior walls of heavy supporting timbers, and ordinary joist floors, large bin area, wooden continuous stairway not enclosed, and other smaller floor openings. The buildings are old but in fair repair.

The height of Elevator A above ground is 140 feet, to the machinery floor, 120 feet.

Indications point to fire having originated from a spark from a passing boat, entering an open window in the canal tower and igniting the accumulated dust on supports and joists forming the walls. The progress of the flames can readily be traced to the roof, and the opinion is that this accumulated dust made a flash hazard and flames spread very fast to top of tower, the sprinklers operated in the tower, and evidently extinguished the fire there, but flames spread so rapidly to roof that the sprinklers did not operate quick enough to catch the fire in its incipiency.

The engineer was in the engine room at the time, saw flames as he passed out of door to the outside, and he states he heard the dry valve trip and alarm ring almost at the same time. He immediately opened throttle wide on steam pump and notified fire department.

The flames spread to the roof, and out into machinery floor of Elevator A. Indications show that the fire extended only a short distance on this floor, but the canal tower acted as a veritable flue, and the heat must have been intense, as all the sprinklers opened on top floor of elevator with but little evidence of fire.

This large opening of sprinklers undoubtedly exhausted pressure tanks in short time, and reduced pressure from fire pumps greatly, so that fire would have eventually gotten away from the sprinklers but for the timely arrival of the fire boats, which actually drowned out what was left of the fire.

It is undoubtedly true that sprinklers held fire in check, sufficiently to allow fire department to extinguish same. The failure of sprinklers to catch the fire in its incipiency, can be accounted for by the extreme flash hazard of accumulated dust on rafters, walls and timbers.

Thirty-five thousand bushels of grain were ruined by water. The loss is variously estimated from $30,000 to $50,000.

Summary: Floor openings and poor construction.

7507. Tupelo, Miss. August 7, 1908. Cotton Yarn Mill. Fire occurred about four o'clock in the morning in the one-story brick addition used as a dye house. Cause unknown but probably the dryer had something to do with it. Dry house and dye house adjoining were equipped with sprinklers but the system was out of service owing to a broken 2½ inch tee in the main sprinkler line, and the post indi-

cator or gate controlling these sprinklers was undoubtedly closed at time of fire. The fire was finally controlled by hose streams. There was an automatic fire door between dye house and engine room which operated, but one sprinkler head opened in the engine room probably before the door closed.

Summary: Water shut off sprinklers.

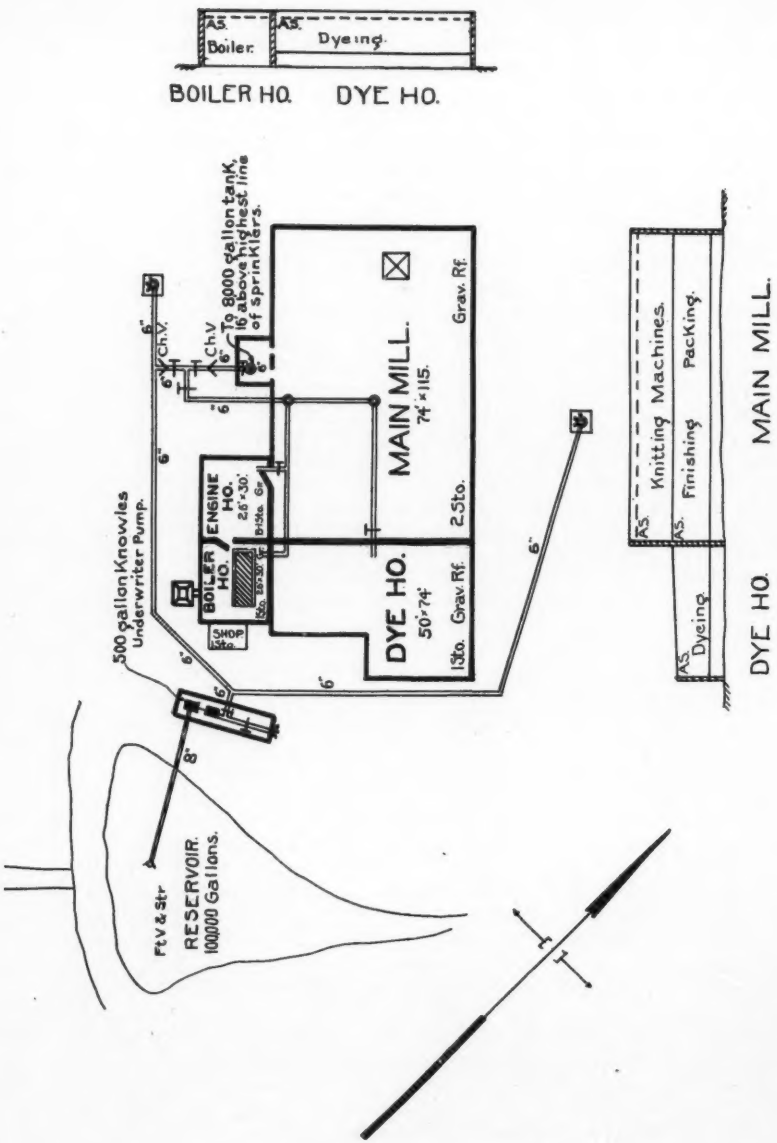
7568. Jonesville, S. C. August 9, 1908. Cop Yarn Knitting Mill. A small two-story brick mill constructed factory with one-story dye house, engine room and boiler house additions, was destroyed by fire. Mill was occupied on the first floor for finishing and packing and on the second floor for the knitting machines. It was equipped with Grinnell glass disc sprinklers installed in 1904, wet system, supplied by 8,000 gallon gravity tank 16 feet above top sprinklers and a 500 gallon steam pump draughting from a 100,000 gallon reservoir. See sketch.

Fire occurred about 2.45 Sunday morning and was discovered by an employee living near the mill. Fire started apparently in first story where the dryers were located, the dryers having sprinklers inside. The employee notified the watchman who attempted to blow the whistle and give the alarm but smoke and flames prevented his getting into the engine room. He started up his boiler fire and went to the pump house and attempted to start the pump. Pump would not start probably due to lack of priming water although there was a 50 gallon barrel and a one inch connection to the sprinkler tank. Some fifteen minutes or more after fire started the steam pipe or connections in engine room were broken off which took away the steam pressure and the fire had to be drawn, thus putting the pump entirely out of service.

It appears that the tank was at least partly empty as tank water had been used the day before for washing out and filling the boiler and it is probable that the tank was soon drained. There may have been concealed spaces or obstruction to distribution in the dry room sufficient to prevent the prompt extinguishment of the fire by the first few sprinklers. There were some small openings from the first floor of mill to the engine room, also a door opening with poor fire door which was open at time of fire. This accounted for the quick spread of fire to the engine room.

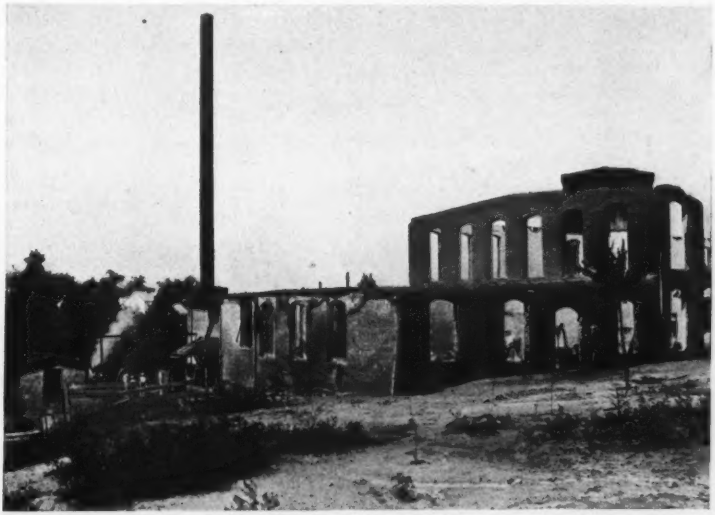
Fire probably originated in first floor near boarding room, the fire gaining some headway before high temperature heads here opened and got into the hollow partition, and sprinklers which opened exhausted the depleted supply in tank without extinguishing the fire in partition. This left fire which gained headway rapidly in the light partitions and with no water in tank spread to engine room and second story immediately causing total destruction of property, as the spectators all say it burned very rapidly and fiercely, and it was only a few minutes after their arrival that the whole mill was on fire from end to end.

It was this combination of circumstances, a service connection to sprinkler tank, concealed spaces in partitions, an inadequate priming


A.S.
Boiler.
A.S.
Dyeing.
BOILER HO.
DYE HO.
To 8000 gallon tank, 16' above highest line of sprinklers.
Ch.V
Ch.V
6"
6"
6"

Sprinkler Fire No. 7568.

Showing broken steam connection to engine. There was no valve in the boiler room controlling this supply.



Sprinkler Fire No. 7568.

Showing detached pump house and steam feed-pipe to pump.

supply for pump, lack of proper valves controlling steam in boiler room, the absence of master mechanic, these being the facts makes apparent the failure of both supplies. Foremost was the service connection and its allowed use, second the concealed spaces in partitions, thirdly, lack of valve in steam main to engine, the other conditions given above each adding their share makes this a complete failure of a two supply protection system.

Summary: Defective water supplies.

7573. Corry, Pa. August 9, 1908. Chair Factory. Three-story frame building of open mill construction. First floor occupied for packing, shipping and storage; second floor, upholstering, packing, some varnishing and storage; third floor, varnishing including dip tanks equipped with automatic covers and overflows.

Fire originated apparently on the second floor of the finishing building. The portion of floor where fire was first seen was occupied as a packing room and contained a large number of finished chairs wrapped in excelsior pads.

Fire was discovered by night watchman between 2.30 and 2.45 a. m. He claims to have made his 2 o'clock round and saw no signs of fire. His attention was called by the dry valve tripping and water going through the pipes, and does not remember hearing the sprinkler alarm gong. When he located the fire it was coming through the south wall just above the second story windows.

He immediately ran to the fire alarm box near west end of plant, but broke box in trying to pull it and was obliged to telephone from a house about 200 yards distant. Fire department responded but did not reach risk until probably a half hour after the fire started.

The cause of the fire is unknown.

When watchman returned to risk after sending in the alarm, sprinklers were in operation and appeared to hold the fire in check.

Public fire department used four streams on the fire, but could not prevent the destruction of the building.

Building was equipped with a modern equipment of Manufacturers latest style heads, supplied by a six inch city connection. Spacing approximately eight feet in seven foot bays, about 80 to 90 heads per floor. Dry system; Manufacturers dry valve.

There was considerable obstruction to distribution on second floor by two 5x12 foot tables set against wall, and finished chairs piled six to eight feet high.

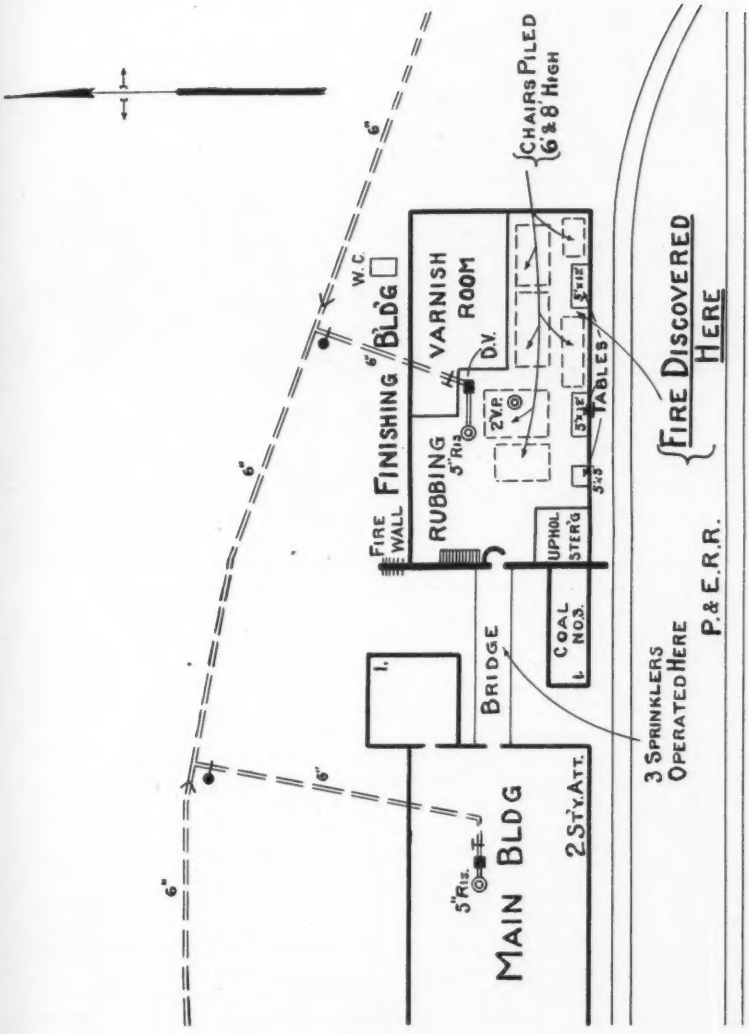
Normal pressure on system is 120 pounds from waterworks. It is claimed that gauge in main mill showed 80 pounds with sprinklers and fire streams running during the early part of the fire.

Dry valve operated, but how quickly it operated is not known. Dry valve found in good condition after the fire and gate valves open.

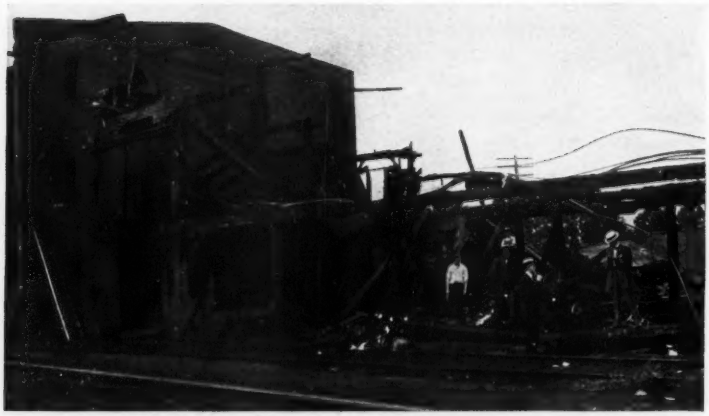
About one hour after the fire started, when it was beyond sprinkler control, the sprinklers were shut off. Failure of sprinklers to control the fire was apparently due to obstructions to distribution.

Building is in ruins except the fire wall facing main mill. There was practically no damage in main mill.

Property loss is said to be between $20,000 and $25,000.



Sprinkler Fire No. 7573.



Sprinkler Fire No. 7573.

Summary: Obstructions to distribution.

7843. Concord, N. C. August 15, 1908. Colored Cloth Mill.

Date of Fire—August 15, 1908. Started at 11.50 a. m. Investigated August 16 and 17. Fire discovered by master mechanic when oiling main bearings in basement of mill.

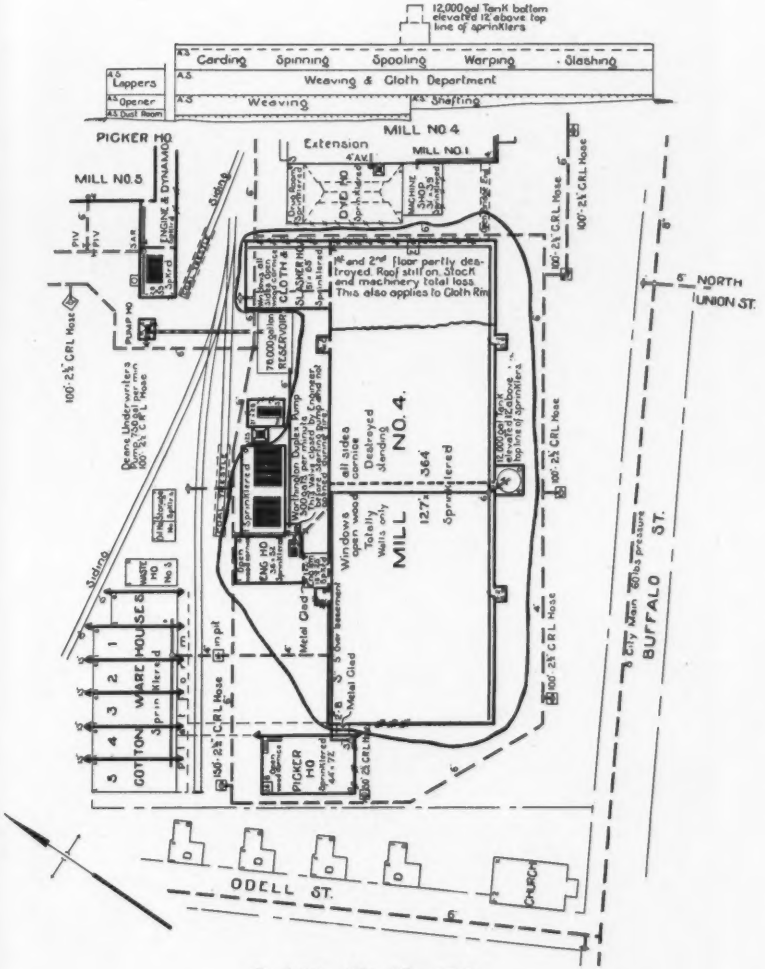
Occupancy and Construction of Buildings Involved—Mill No. 4, two stories and basement under the west half, 127x364′, of brick, standard mill construction throughout, except first floor, heavy joist construction; occupied, basement weaving, dynamos and hot air heating apparatus; first floor, weaving and finishing department; second floor, carding, spinning and spooling.

On the east is a two-story mill constructed slasher room, 50x65′, opening direct into mill without any cut-offs.

The engine room, 36x52′, basement and one story, located about 18 feet north of the main mill and communicates with it through a frame, iron-clad passageway, 18x25′. Through this passageway a 30 inch double belt drives to the basement of the mill from the fly-wheel to the main pulley on the main line shaft overhead. From the engine fly-wheel a 36 inch double belt drives to main line shaft pulley overhead in the top story, there being no cut-off. In this engine room, the 500 gallon Worthington duplex pump was located.

Adjoining the engine room on the east is the one-story, brick, mill constructed boiler house, 32x65′, in which is located seven old horizontal return tubular boilers.

About 10 feet west of the main mill, is the basement and two-story brick, mill constructed, picker house 44x72′. The east wall of the picker house facing the mill is a solid blank wall with the exception of one door opening in the southwest corner to the elevator tower.



Sprinkler Fire No. 7843.

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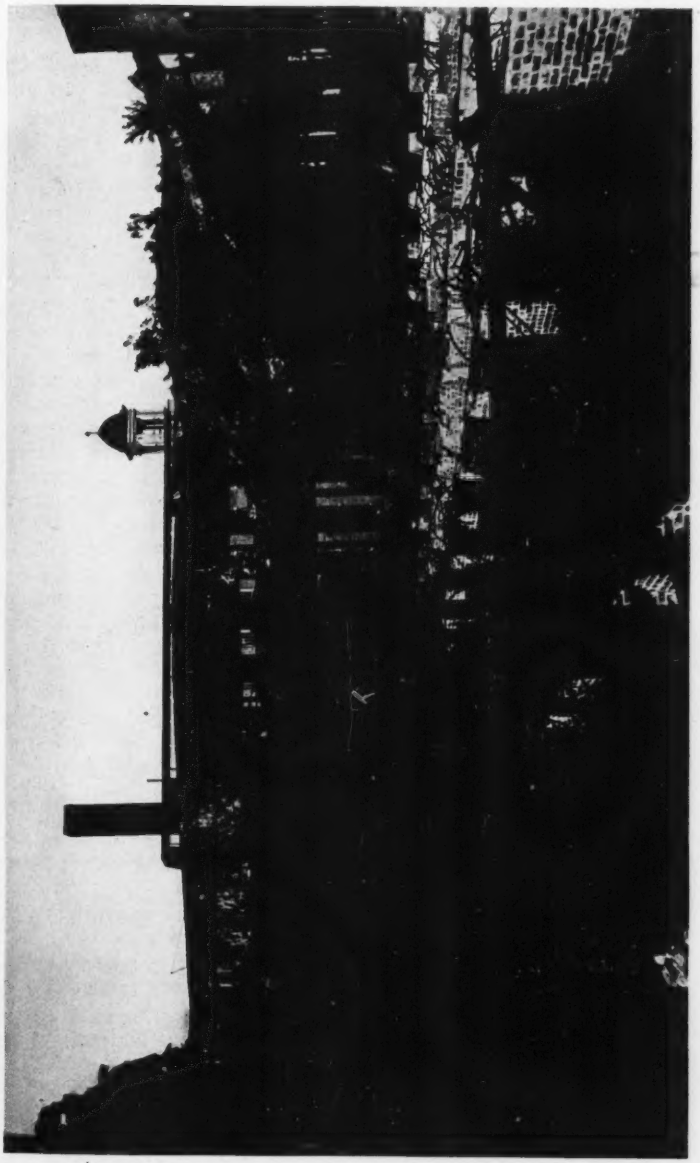


Sprinkler Fire No. 7843.

Opposite this doorway and across the elevator tower was a doorway in the mill, and each of these doorways was protected by a non-standard, tin-clad swinging door, not automatic. The basement of the picker house was used as a dust room; the first floor for the openers, and the second story for the intermediates and finishing picker machinery.

East of the Mill No. 4 and the slasher room addition, located about 12 feet away, is the one (high) story brick, ordinary joisted construction dye house of Mill No. 1. This dye house wall facing No. 4 Mill is principally of glass and frame work, and the windows in the Mill No. 4 opposite are all unprotected.

Extent of Damage—The fire completely destroyed Mill No. 4, engine and boiler room, and badly damaged the adjoining slasher room. The picker house was not much injured, and Mill No. 1 and adjoining dye house was not damaged.

Cause of Fire and How Fought—The fire started at one of the bearings of the main shaft hung overhead in basement. This bearing was next to the main drive pulley and was a chain oiling bearing. The chances are that some sediment in the oil clogged the chain and stopped its revolving, thus allowing the bearing to quickly heat up, although at the time the fire started the looms were not being operated and, therefore, there was not the usual draught on this line shaft. The engineer discovered the hot bearing and sent the oiler to attend to it, in the meantime shutting down the engine. The oiler poured oil into the bearing and the oil immediately flashed up, and he jumped for a pail of water and threw it onto the fire, thus spurting the fire onto the main belt. The engine, not having stopped, carried the burning belt into the engine room where the fire was transmitted to the 36 inch belt, which carried it into the carding room on the top floor.

The sprinklers, the three mill fire-pumps, the mill hydrants and hose, the city fire department with a hose wagon and combination wagon, and the hose reel company from the Cannon Mills fought the fire from the outside, since through ignorance the valve cutting the hydrant main off from the sprinkler system was closed from the start and the sprinklers had only the 12,000 gallon tank to supply them. No effort was made to extinguish the fire in the main mill, it being found beyond them, and all effort was directed towards saving the picker house and preventing fire spreading to No. 1 Mill Group.

Apparatus Used—One fire-pail, automatic sprinklers fed by 12,000 gallon tank, private hose, city hose streams from city and mill hydrants, the city hose wagon and combination wagon responding to the alarm, and the apparatus from the Cannon Mill hose reel company.

Protection—This mill is one of a group of five mills surrounded outside by a circulating six inch yard main, and into this main three fire-pumps are arranged to discharge; one 500 gallon Worthington duplex pump located in the engine room of No. 4 Mill, one 500 gallon Worthington duplex pump located in the engine room of No. 2 Mill, and one Deane Underwriters pump of 750 gallons capacity located in outside pump house in connection with No. 5 Mill. The No. 4 Mill pump and the No. 5 Mill pump take their suction from a 78,000 gallon

reservoir, and the No. 2 Mill pump takes its suction from an 80,000 gallon reservoir. In addition these reservoirs are supplied by two 2½ inch outlets from a four inch service main, fed by pumps located at the Buffalo creek about one-half mile off.

Inside mill was protected by a system of Grinnell metal valve sprinklers, and the extension to slasher room was equipped with Manufacturers' sprinklers; all these being pendant; original equipment put in by the Providence Steam and Gas Pipe Co. in 1894. All sprinkler heads were pendant and under the wet pipe system with all inside controls. The sprinkler equipment was practically complete, covering the mill, slasher room, boiler and engine room, picker room, and that part of the basement cut off by brick walls used as a weave room. The east half of the basement, cut off by a brick wall, was vacant and unoccupied. The water supplies were primary steel tank of 12,000 gallons capacity, elevated 12 feet above top line of sprinklers, located in a stair tower on the front side of the mill. Secondary supplies are from the three fire-pumps mentioned above.

The sprinkler equipment was old standard; spacing averages 9x10′; one six inch riser from the sprinkler tank, and one six inch connection from the hydrant line; pipe sizes are the old 1-3-6 schedule, the greatest number of sprinklers in one fire section being 480 on one six inch riser. In the Main Mill, sprinklers were all fed from feed mains in the front side of the mill, making exceedingly long branch lines running practically the entire width of the mill. The pressure on top line of sprinklers was eight pounds from the gravity tank.

Alarm Service—There were no alarm valves in this system, the only alarm service being two watchmen on duty nights and Sundays and holidays during the daytime, and making rounds hourly, recording same on a Newman portable watch. This fire occurred in the daytime, and the alarm was given by the engineer blowing the mill whistle, and the alarm was sent to the fire department over the telephone in the office. It is reported that on account of the busy time of day, there was considerable delay in getting the fire department headquarters and getting the fire alarm to the chief.

The Story of the Fire—One of the main line shaft bearings at the main drive pulley in the basement of the mill became overheated and was discovered by the engineer, who is a colored man having been in the employ of the company for thirty-one years and in general charge of the mechanical end of the power plant. He detailed a mechanic to attend to this bearing, and in the meantime started to slow down the engine. The mechanic poured oil into the bearing and this oil immediately took fire; he seized a bucket of water and threw it on the bearing, which at once spread fire onto the 30 inch double belt, which had been in service for fourteen years and was probably well soaked with oil. This burning belt carried the fire into the engine room and communicated with the 36 inch belt running alongside of it on the fly-wheel, which immediately carried the fire to the carding and spinning room on the top floor of the main mill. The mechanic reports that when the oil flashed up, several sprinklers opened around the bearing and extinguished the fire, and that when he left the room

he was thoroughly soaked. In the meantime the engine was shut down, and the 350 hands employed in this building, thinking the noon hour had arrived, rushed out of the mill.

Witnesses report that the fire in the top story flashed over the entire room very quickly, and on account of its being Saturday the general cleaning up was going on and the chances are the air was filled with flying lint, which would help the spread of the fire in this room. In addition to the machinery handling the coarse material, there were open stock bins located along the sides of the room which probably added to the spread of the fire.

The engineer, after shutting down the engine and seeing the fire in the top story, immediately started the fire-pumps, which took water at once and not understanding the valves controlling the system, he next cut off the valve between the pumps and the sprinkler system, so that the 12,000 gallon tank was left as the sole supply to sprinklers in this entire group and was, of course, quickly exhausted. Men immediately rushed to No. 5 Mill pump, connected two lines of hose to the pump and started it up. This pump was probably in working order in ten minutes after the fire was discovered. The engineer then went to No. 2 Mill pump and started it up, and all pumps worked well. Six streams were soon in play from the private hydrants, and in about thirty minutes the Cannon hose reel company arrived and attached one stream to the hydrant line. The city fire department had arrived and attached six lines to the city hydrants and two lines to the mill hydrants. Apparently the mill was doomed, and all efforts were directed towards keeping the fire from spreading to the picker house at the west end and to the No. 1 Mill Group at the east end. Good work was done by the firemen in preventing the spread of the fire. Fire chief reports that he received the alarm at 11.55, and responded with the hose wagon and combination wagon and had eight streams in play as noted above. He reports that normal city pressure from the standpipe is 40 pounds, and he estimates that during the fire the pressure was between 30 and 35 pounds at the hydrants. He further reports that as soon as he arrived at the fire he had one of the pumps started at the pumping station and he had water pumped into the city standpipe during the fire but not directly into the mains. As the city standpipe has a capacity of 140,000 gallons, the fire chief claims that about 250,000 gallons of water was used through the city main. They report that the fire was under control at about 1.30 p. m. and practically out at 2.15.

The mill pumps were supplied from private reservoirs having a combined capacity of 158,000 gallons, and these being supplied through a four inch pipe from the Buffalo creek pump under 60 pounds pressure. It is estimated that about 300,000 gallons of water was discharged by the mill pumps.

The fire in Mill No. 4 burned down from the top floor into the first floor, then into the basement, spreading to the engine room and picker room from the basement. The fire-pump in engine room No. 4 ran until about 1.45, even after the engine room roof had fallen in,

and it was not put out of commission until the falling of the boiler house roof broke the steam drum over the boilers.

The walls of the main mill and slasher house addition are all standing and appear to be in good condition. This fire illustrated the value of self-releasing timbers in mill construction, since falling timbers in no way injured the walls.

There are two points brought strongly to our attention by this fire; first, the old story of the main drives being run directly into the several stories from the engine room; second, the lack of knowledge on the part of the assured of the purpose of the controlling valves.

We believe that had the engineer left the valve from the pumps to the sprinkler equipment open, as was intended, the mill could have been saved with half the loss.

Inspector arrived at the mill the morning after the fire, and had all fire protection in the remainder of the property put back into full commission.

The Sprinklered Risk Department has recently supplied its inspectors with metal car seals for sealing open all valves, and the inspector was on his way to this mill to make the inspection but unfortunately did not arrive before the fire destroyed the building.

Summary: Light water supply and pump not used.

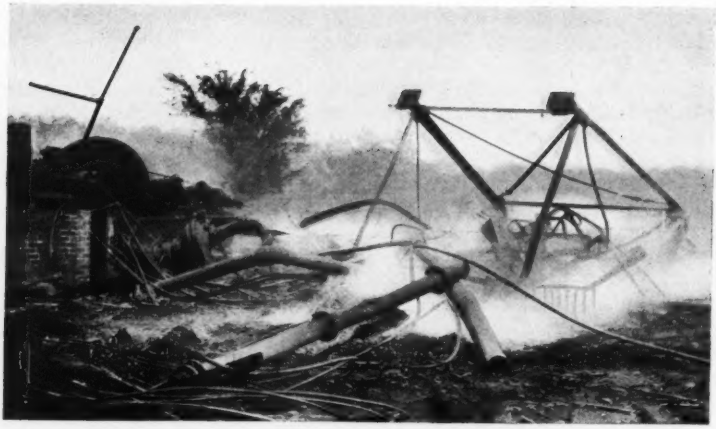
7742. Bridgewater, Mass. August 16, 1908. Leatherboard Mill. Small country frame leatherboard mill equipped with sprinklers supplied by a 5,000 gallon tank on steel trestle and a 500 gallon rotary pump. Fire started outside in yard in a pile of leatherboard scrap (hide-ite or prepared leatherboard), the cause being probably spontaneous combustion. There was about two tons of this scrap in the pile about six feet high and one or two feet from the steel trestle supporting the tank.

Fire occurred about noon on Sunday and was discovered by an employee from his house some 1,500 feet distant. The engineer and watchman were busy in the boiler room. They tried to connect hose to the pump but the fire was too close and there were no outside hydrants. The pump was located near where fire started. Fire soon spread to the outside of factory and it is stated that inside of ten or fifteen minutes the tank trestle collapsed owing to the heat, thus putting the entire fire protection out of service. The rotary was connected by spur gears, water wheel had to be started and gears thrown in before pump could be used. There was no outside protection other than mentioned and entire plant was destroyed. The sprinkler system was entirely out of service early in the fire.

Summary: Exposure fire.

7840. Holyoke, Mass. August 21, 1908. Paper Mill. Fire occurred in duster room, brick walls, joisted ceiling. Risk was equipped with Grinnell glass disc sprinklers, wet system, supplied by waterworks 80 pounds pressure, 40 opened. Fire started in duster probably from match in stock.

The duster consists of a drum covered with spikes enclosed in boxing from which the dust is exhausted by a fan. After dusting the door in the boxing is opened while the drum is in motion and the rags



Sprinkler Fire No. 7742.

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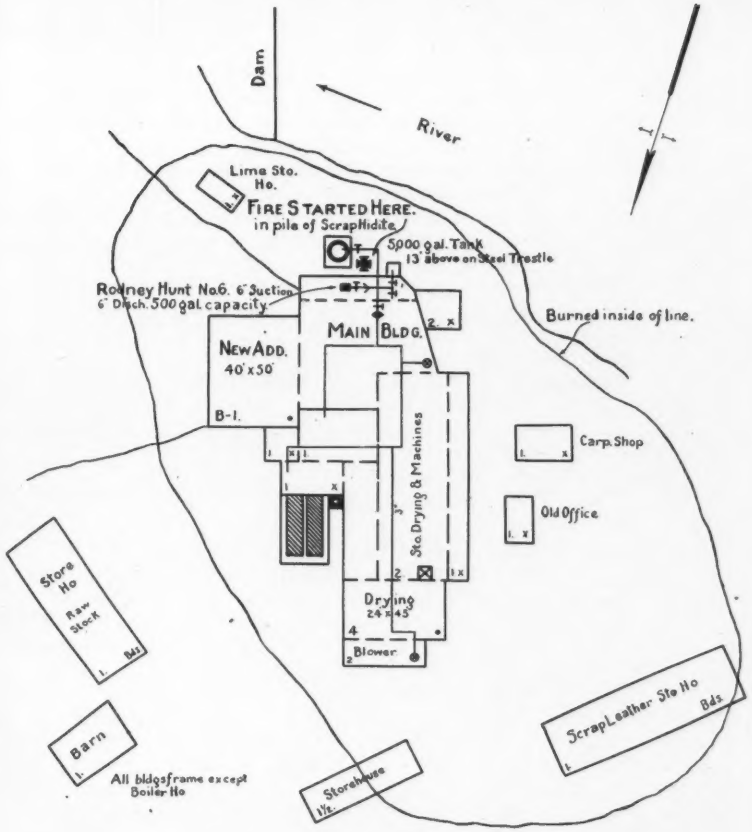


Sprinkler Fire No. 7742.

drop through a hole in the floor to the room below. Fire was discovered while the rags were dropping through the floor, but did not reach the interior of the duster. The fire spread rapidly through the pile of rags in the second floor and up to the roof through the hole in the attic floor at the duster. Several holes were burned through the roof and the joists and exterior of the duster boxing charred.

The sprinklers are mostly Grinnell metal type, piped by the old schedule, with heads upright and from 12 inches to 18 inches below the joists. Eleven heads opened in the roof and three in the second floor. The hose streams probably prevented more heads from opening. At the request of the chief of the fire department, the sprinklers were shut off about 20 minutes after the fire started. The water from them hindered the firemen. The splash plates deflected the water

downwardly and gave little protection to the ceiling. Several of the splash plates stuck in the frames, giving unequal distribution of water.

The management have ordered Grinnell glass sprinklers to replace all metal type in the addition. The boxing over the large opening in the attic floor is to be removed and the opening closed with plank.

Summary: Generally defective equipment.

7430. Saco, Me. September 15, 1908. Box Factory. Frame box factory well equipped with sprinklers but surrounded by large quantities of lumber only a short distance from the building, no clear space being required. Fire started in the lumber yard and was soon beyond control of the fire department. It attacked the sprinklered factory on the outside and mill was destroyed. There were 23 dwellings burned and several stores, also large quantities of lumber owned by other people.

Summary: Exposure.

7163. Elberton, Ga. September 8, 1908. Cotton Mill. Fire occurred in finished goods warehouse, the cause being undoubtedly incendiary. The water was shut off sprinklers so that they were of no service.

Summary: Water shut off sprinklers.

7841. Troy, N. Y. September 22, 1908. Waste Factory. Brick building, mill constructed with stairway and elevator in cut-off tower. Risk equipped throughout with Grinnell glass disc sprinklers, dry system, good spacing and arrangement, supplied by waterworks giving about 35 pounds on sprinklers that operated and a gravity tank. Forty-nine sprinklers in all opened, all but three opening on the second floor. The tank was exhausted during the fire and the waterworks supply shut off after the fire was under control.

Fire occurred on second floor used for dusting and sorting. It started in a duster and spread to the stock in the room. There were several girls in the room at the time who escaped with difficulty, two of whom died from burns, showing the rapid spread of the fire. One section of the room was cut off by fire doors but fire spread through same before the fusible link melted. Fire also spread up elevator shaft as the fire doors were open and not automatic.

There was 35 pounds pressure on the sprinklers but after the fire it was discovered that a number of the sprinklers on the second floor were badly clogged with sediment and practically inoperative. This together with more or less obstructions from stock piles doubtless accounted for the failure of the sprinklers to hold the fire in check.

Fire was finally controlled by the fire department with a reported loss of about $25,000.

Summary: Sprinklers clogged with sediment and obstructions to distribution.

LARGE LOSS SPRINKLER FIRES.

Where Sprinkler Control is Satisfactory.

7561. Montreal, Canada. August 10, 1907. Tenant Manufacturing. Fire started in closet in top floor about 8x5 feet with open top

except that top had been covered over by an old door. Fire spread from this closet into concealed space under roof where there were no sprinklers. Part of the roof was burned and will have to be replaced. The sprinklers held the fire in check in the top floor. Loss $6,000.

Summary: Unsprinklered portions and concealed space.

7513. Nashville, Tenn. September 29, 1907. Mercantile. Severe exposure fire at rear of four-story brick building with unprotected windows. Heat from fire broke glass in windows, charring frames and setting off 13 sprinklers inside the building. These sprinklers did excellent work and kept the fire from entering. Loss about $20,000.

Summary: Exposure.

7437. Philadelphia, Pa. March 2, 1908. Clothing Factory. Fire occurred on third floor occupied for manufacturing women's waists. Six sprinklers opened and practically extinguished the fire but with considerable loss from smoke and water. Loss $8,000.

Summary: Not classified.

7466. Lawrence, Mass. May 15, 1908. Cotton Mill. At about 3.30 p. m. fire was seen near the head of a mule in the spinning room in the upper story of No. 2 Mill. It quickly spread from the head into both carriages. Fire pails and small hose were used, but the dense smoke quickly drove the men from the room. Twenty-one sprinklers opened and held the fire until the windows were opened and the room was partially cleared of smoke; then the fire was extinguished in the mule carriage by one small hose stream, and the supply to the sprinklers was shut off. Meanwhile the water had leaked through the floors, damaging the clothing on cards in the room below, and the spinning frames in the third story were also wet. There was but little damage to the weaving in the first and second stories. Prompt attention was given the stock and machinery. A few waterproof covers which were on hand and also many laps were used to cover the cards. The need of a good supply of covers and small hose was apparent and the same will be provided. The management showed good judgment in not allowing large hose streams to be used, although the large amount of smoke which poured out of the windows made it appear as though the whole top of the mill was on fire. The manager's confidence that the sprinklers would hold the fire until its extent could be definitely ascertained, undoubtedly saved a much larger water damage, which would have followed if the large streams had been brought into play. The cause of the fire was without doubt friction in the mule head. Loss, $6,748.19.

Summary: Obstructions to distribution.

7560. Rome, N. Y. June 6, 1908. Knitting Mill. Fire occurred on third floor used for storage of finished stock. Alarm was given promptly and two sprinklers practically extinguished the fire aided by small hand hose. Considerable amount of finished goods damaged by water. Loss $10,000.

Summary: Not classified.

7844. Chicago, Ill. July 13, 1908. Metal Worker. Fire started on fourth floor, occupied for japanning and enameling metal goods,

probably caused by spontaneous combustion of oily rags in barrel of loose paper and excelsior. Thirteen sprinklers opened and held the fire in check, but fire was allowed to spread owing to the poor spacing of the sprinklers on semi-mill ceiling. There were unprotected channels along which fire ran and also it spread along one inch space between double girders where the water from sprinklers could not reach it. Loss $8,600.

Summary: Defective sprinkler spacing.

7819. Cincinnati, Ohio. July 31, 1908. Cotton Waste and Batting Manufacturing. Fire occurred in the second story occupied for storage of cotton in bales and carding machines. Nineteen sprinklers opened and held the fire in check, but considerable damage resulted owing to the difficulty of completely extinguishing the fire in the bales and large piles of cotton. Loss $9,800.

Summary: Obstructions to distribution.

7787. Kearney, N. J. September 4, 1908. Linoleum Manufacturing. Fire occurred in second floor of two-story brick building, mill construction, occupied for storage of ground cork and for rolling and mixing. Twenty-eight sprinklers opened and properly held the fire in check. The room in which the fire occurred was used for storage of ground cork in bags. The cork is delivered to room by a metal enclosed conveyor from cork grinding building 38 feet at north and is bagged as soon as received, bags being filled from end of conveyor spout. The filled bags containing 56 pounds each are piled at north end of room about 13 feet high and at time of fire there were about 1,300 bags covering an area of about 30x40 feet. In this room at the south end the ground cork, the oxidized oil and dry colors are mixed and delivered to the floor below through chutes. An employee who was at work in the room at the mixing machine claimed that there was a slight explosion like a pistol shot which blew out one of the windows and flames shot up from the bagged cork at once. A stream from the 30 gallon extinguisher was turned on the blaze with apparently no effect other than scattering the flames.

The sprinklers operated almost immediately and the smoke was so dense that A. D. T. alarm was turned in from private box and the local department responded. Meanwhile the pumps of the assured were started and four streams put on the fire. The local department put five streams on the fire and wherever they saw smoke issuing, doing considerable damage by water. The sprinklers operated satisfactorily and held the fire in check. The damage to the building was very slight; the ceiling of the monitor skylight and part of the roof of main building only being slightly charred where the water from the sprinklers did not reach. The damage is largely from water and the damage to stock in adjoining sections was due to the fire doors being held open to allow hose streams to pass through thus allowing hose streams playing from west side to pass through door and wet stock. Damage also was due to floor in one section being on a lower level and stock not being skidded; finished stock was standing on end in rolls here. Loss $7,000.

Summary: Obstructions to distribution.

OTHER SPRINKLER FIRES OF ESPECIAL INTEREST.

7574. New York, N. Y. July 8, 1908. Grain Elevator. Fire occurred in basement under tracks occupied for belts, shafting and conveyors. Open joist construction, heavy plank flooring. Fire caused probably by a hot bearing. Seventy-two sprinklers opened and held the fire in check so that fire department had no difficulty in completing the work. The opening of so many sprinklers was probably due to obstructions, it also was an old equipment with 12 foot spacing across joists not staggered. But for the sprinklers this property would probably have been destroyed.

7518. Atlanta, Ga. July 13, 1908. Furniture Factory. The fire which destroyed the Atlanta Box Company on the night of July 13, 1908, also did considerable damage to this property. This property adjoins and communicates with the Atlanta Box Company on the east through windows and one doorway which opens directly into the Atlanta Box Company. All windows exposed by the box factory, eight on each floor, were of wired glass in metal frames (not standard), and one opening from the basement of this risk to the basement of the box factory was protected by a non-standard tin-clad fire door.

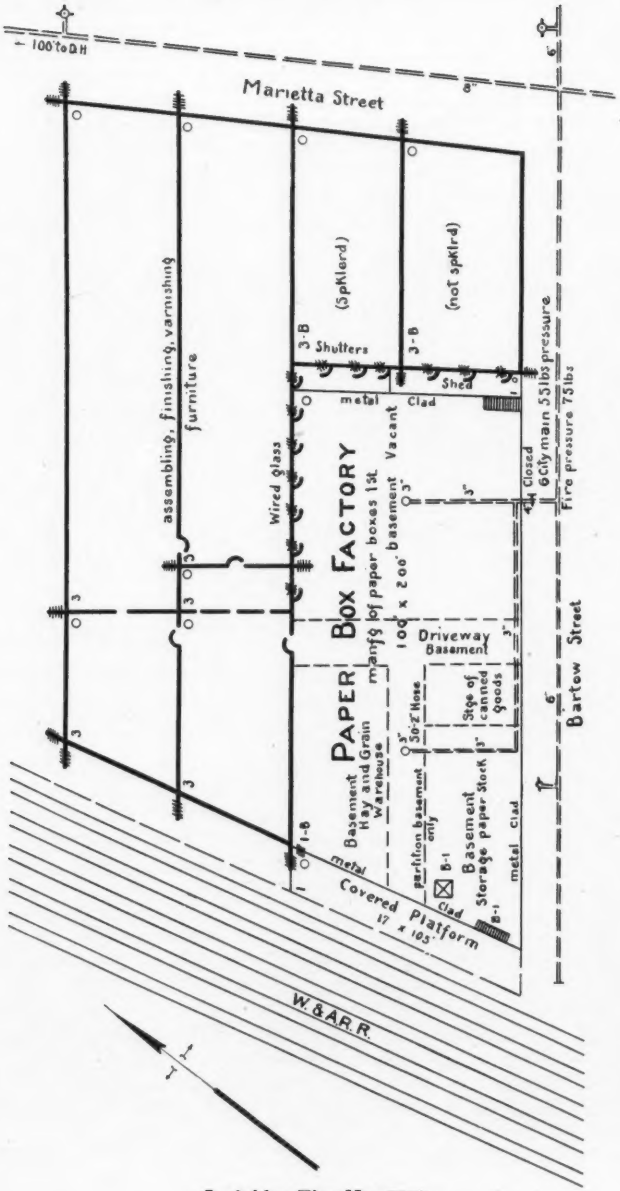
Owing to the nature of the stock in the burned building and its construction, the heat was very severe, and 16 of the 24 wired glass windows, referred to above, were entirely destroyed. Of the remaining eight windows, a portion of two of them was entirely melted out; six are so badly damaged that they will have to be replaced. The fire door in basement wall is still in position, but the entire core was burned out, and the tin is so badly damaged that a new door will have to be provided.

The wired glass windows against exposures afforded no protection. Men who were in this building during the fire state that just as fast as the heat became sufficient, the glass cracked and warped and drew out of the frames.

As fast as the windows gave way, the sprinkler heads directly above them opened and prevented the fire from entering the building. In all 14 sprinkler heads opened.

Two hose streams were brought into this building, but were used on the burning building adjoining, and not as a means of keeping the fire out of this building. The fire door in the basement was not closed entirely and one sprinkler opened above this door and prevented fire from entering at this point.

The excellent service rendered by the sprinklers undoubtedly saved the east section of this risk from serious damage by fire. As it was, the only serious damage to the building was that done to the windows. The contents of the building were somewhat damaged by water, and some furniture which was piled near the exposed windows was blistered by the heat. Considerable of the water damage was caused from leaking hose brought into building by the city fire department.



Sprinkler Fire No. 7518.

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Note.—This fire appears to again demonstrate the need of standard frames and sash for wired glass windows, and although this particular fire was a most severe test, it is probable that had wired glass windows been standard in all respects the result might have been different.

7782. Fort William, Ont. July 20, 1908. Tenant Manufacturing. Two-story frame, metal clad, cement filled, building was protected on the outside by a line of open sprinklers at the eaves and another line along the metal cornice over first floor.

These sprinklers were used to advantage as a protection against severe exposure fire with wind blowing against risk, and while the system is old and not up to standard it was undoubtedly a considerable factor in saving the property.

7543. Seattle, Wash. August 19, 1908. Flour Mill. Fire started about 6.45 a. m. in break roll second story of mill, probably caused by piece of metal in wheat. Roll suction spout drew fire to suction trunk in third story of mill. Explosion in trunk and spouts blew top off wooden trunk above fan, starting fire in third story of mill near south wall. One head fused here extinguishing fire without aid. Fire also broke out of roll in second story and was extinguished by pails of water. No hose used. Damage slight.

7842. Atlanta, Ga. September 12, 1908. Cotton Seed Oil Mill. Fire occurred in large frame hull house, 45 feet north of mill, two-story and basement of ordinary joist construction. Fire was discovered about 10.45 p. m. by watchman. Cause unknown.

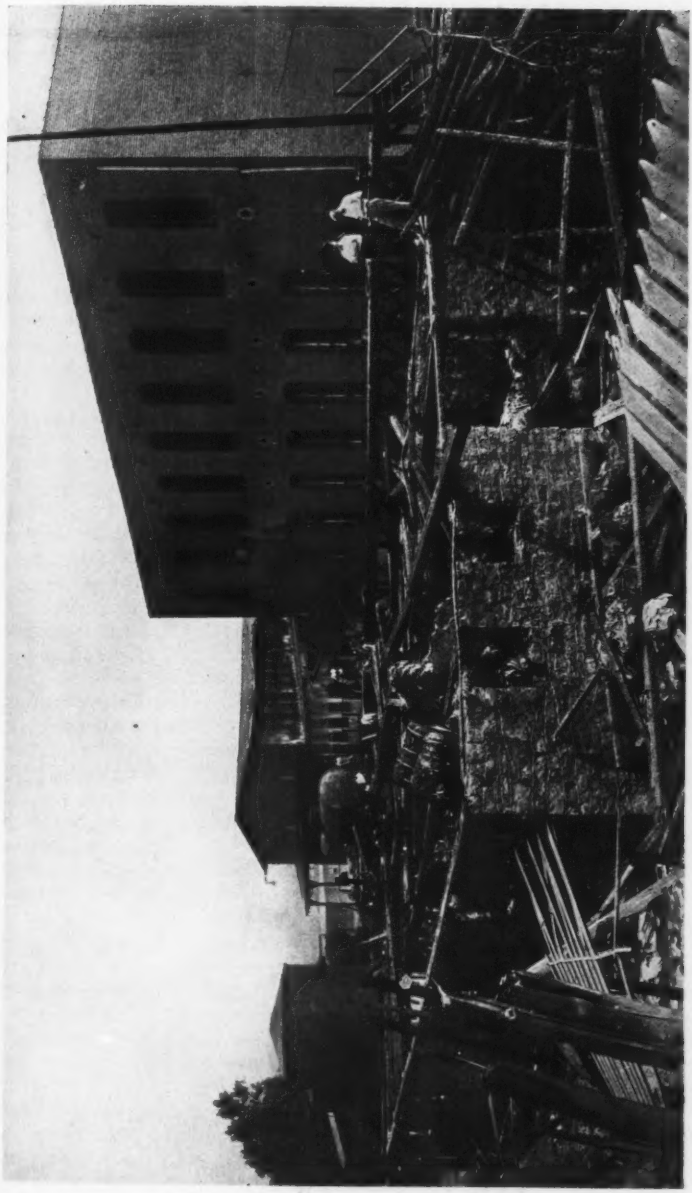
Hull house was a total loss and was a severe exposure to the brick oil mill. All of the windows on the north side of the oil mill were broken out and sash charred. Ninety-eight automatic sprinklers at the side of the mill opened and stopped the fire from getting a foothold inside. An excellent example of automatic sprinklers holding off a severe exposure fire. There was no special window protection.

EAST BOSTON DOCK CONFLAGRATION.

July 8, 1908.

The fire which occurred on the Grand Junction property at East Boston, was first noticed at about four o'clock in the afternoon by some of the tug-boats in the harbor, and the first alarm was given from Box 619, the special box for the property, at 4.11 p. m.

Four piers, known as Nos. 1, 2, 3 and 4, the grain elevator and the conveyors from this to the piers, the office building, the boiler house and engine house of the elevator, and the electric light plant were destroyed. There were also several barges loading and discharging, some totally destroyed and several severely injured, and three vessels lying near the piers were also more or less severely attacked by the flames. There were 58 cars in the sheds and yards which were destroyed, and eight which were badly burned. There was also some damage in the southeasterly section of the brick warehouse known as B, C, D, E, F and G, and some damage to the property of the Massachusetts Wharf Coal Co. adjoining Pier 4 on the east.



Sprinkler Fire No. 7842.

The general arrangement of these buildings is shown on plan.

The buildings on the piers were all used for the unloading and loading of steamships, Pier 1 being occupied by the Cunard Steamship Co., Piers 3 and 4 by the Leyland Line and Pier 2 as a general landing shed. The very miscellaneous character of the stock in these sheds is indicated by the following list:

In Pier 1, wool, chloride of lime, imported rags, staves and onions.

In Pier 2, macaroni, tea, bran, household furniture, rags, sumach, pumice stone and flour.

In Piers 3 and 4, lumber, hay, straw, provisions, cotton waste, wool and Egyptian cotton.

The building on Pier 1 was comparatively a modern shed, built in 1902. It was one and two stories high, the second floor being arranged for the landing of passengers and the examination of immigrants. It was divided, as is shown on the sketch, by a brick wall, but this wall was pierced by a very large number of openings which were intended to be closed by fire doors. The centre opening, however, through which two railroad tracks ran, was approximately 15 feet wide by 18 feet high, and as there were cars in this opening, it was impossible to close the doors, even if the rapid progress of the fire had allowed it. There were also three other large openings for teams and two smaller openings for trucking. These were provided with standard tin clad doors, but at the time of the fire they were all open and the rapidity of the fire made it impossible to close them. The structure was of wood and was not protected with automatic sprinklers. The areas, as will be seen from the plan, are large.

The sheds on the other three piers were not of modern construction; were built entirely of wood, although partially covered on the outside with corrugated iron and had no dividing walls.

The elevator had a brick wall to the bottom of the floor under the bins. Above this it was constructed of wood covered with slate and had numerous unprotected windows in the monitors. The amount of grain in the elevator was very small—about 25,000 bushels. The elevator was of an old type, having been built about 30 years ago. It was 400 feet long, 60 feet to the eaves and 125 feet to the top of the roof. It was divided by two brick walls, 48 inches thick to the bottom of the bins and 24 inches thick above. These, however, had no effect in protecting the building, as the fire attacked it from the side and went into all sections practically at the same time.

The buildings were under the protection of the Boston Fire Department which has 42 engines and two fire-boats, one of these fire-boats being out of commission while under repair. The fact that all but three of the engines are located in other parts of the city and that most of them have to cross to East Boston by the ferry-boats, probably delayed the massing of a large number of engines for a few minutes.

The water supply on Marginal Street consists of a 12 inch main fed at both ends by 12 inch mains from 20 inch mains and there was in the yard the eight inch connection from this main to which were

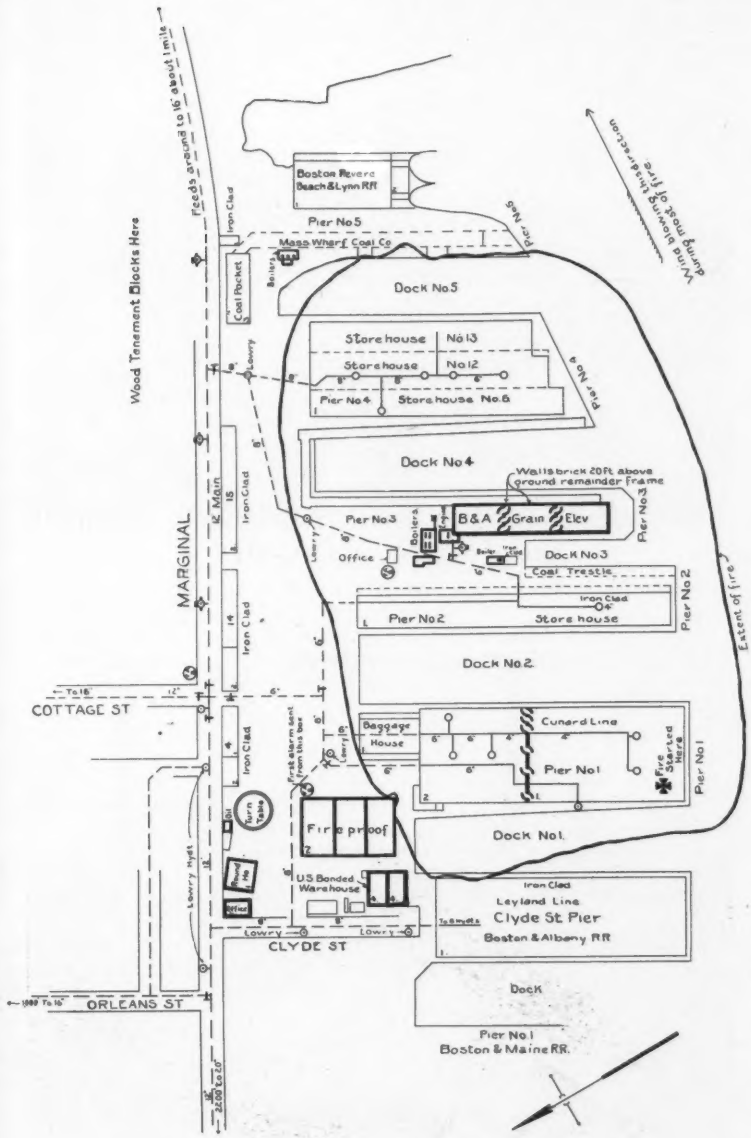


Diagram East Boston Dock Conflagration.

Cunard Steamship Shed, Pier No. 1.

Looking Across Piers Nos. 2 and 3.

located three hydrants and to which were connected standpipes in all of the piers.

The fire started in the southwesterly corner of Pier 1, probably in a toilet room for the men from the dropping of a match by some one smoking. As there were but few men in the shed, and these were employed near the centre wall, the fire was not discovered by them until after it had been seen by the crews of tug-boats and ferry-boats outside of the building, and it probably had been burning several minutes on the under structure before it was noticed by anyone. There was a strong northwest wind blowing, and by the time the alarm had been pulled, the fire was spreading with such rapidity that the men were obliged to run out of the lower section in order to save their lives, and it is believed that one man who went back into this section was killed.

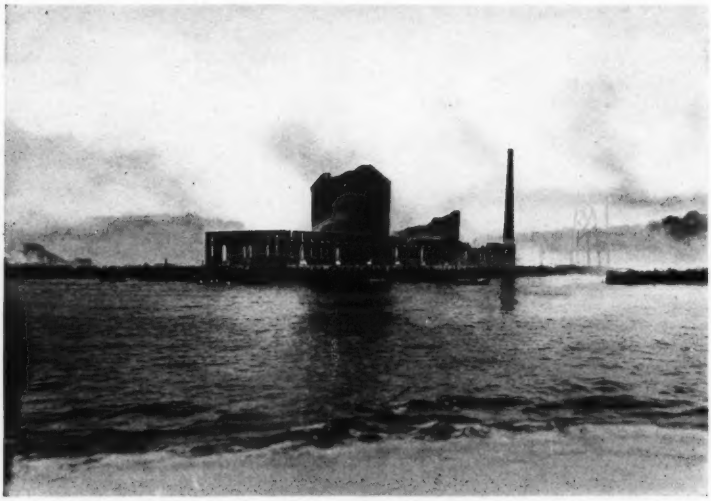
The first engine to arrive took position at the hydrant near end of the fireproof store, and laid two lines of hose into the upper section into which the fire had not at that time spread, but before water could be let into the hose the fire spread with such rapidity that they were obliged to run out and leave the hose to be destroyed. From this shed, which was practically in ruins in 25 minutes, the fire spread with great rapidity to Pier 2, and to the elevator, and the efforts of the firemen had to be confined to preventing the spread of the conflagration to the cars in the yard and the other buildings.

The single fire-boat which was in commission endeavored to prevent the spread of fire to Pier 2, but was driven out by the heat and did not succeed in making a successful resistance to the fire until it was below Pier 4, about an hour and a half after the fire started.

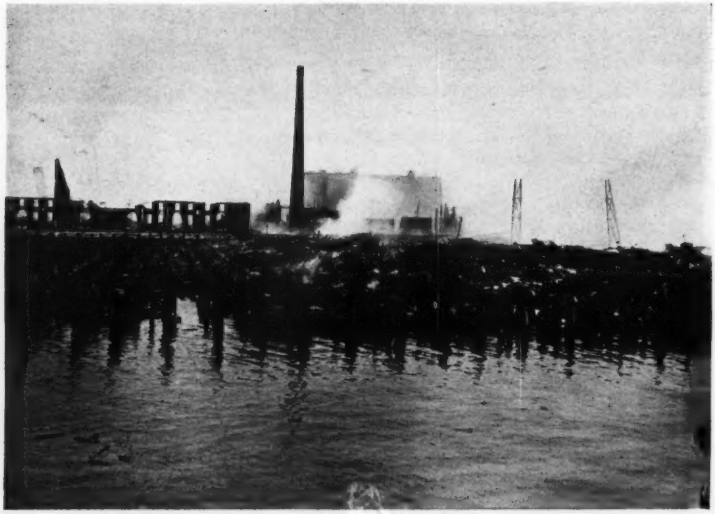
The fact that the curve of the shore, combined with the direction of the wind to decrease the amount of combustibles exposed to the great heat of the conflagration, had undoubtedly much to do with the fact that the fire was successfully held at the point noted above. If the wind had been further to the westward, it is more than probable that a conflagration in the Jeffries Point section would have taxed very severely the water supply in this section, and it is undoubtedly the case that if this property is to be thoroughly protected, a considerable increase in the size of the mains on Marginal Street is necessary, and it is desirable that this matter should be taken up at as early a date as possible, for the reason that the Boston & Albany Railroad has expressed its intention of rebuilding the property with even larger sheds than those which existed at the time of the fire.

The following conclusions are perhaps so evident that it is scarcely worth printing them, but following the usual custom of the reports of such matters I embody them as follows:

First, it is reasonably evident that no fire in a wharf shed of this type can be controlled by fire department streams, and it is therefore necessary to sub-divide them in such a way that sprinkler protection can be reasonably effective. Some such plan as that followed in the sheds erected by the Boston & Maine Railroad on the Hoosac and Mystic Piers seems to be the most satisfactory, and does not call for extravagant expenditures in the class of building to be erected.



Grain Elevator, Pier No. 3.



Looking From Outer End of Pier No. 5 Across Piers Nos. 4, 3 and 2 Towards Fireproof Storage Warehouse at Head of Pier No. 1.

Second, no private hose and standpipe system is of any particular use in a shed which is thoroughly on fire, but is very necessary to take care of incipient fires and should be planned for this purpose. The fact that a considerable waste of water was caused when the standpipe system in the first two sheds was broken off can easily be remedied by proper shut-off gates located where the supply from the city main enters the private grounds of the railroad and this is of course a matter of very serious importance. There were probably some shut-off gates in existence, but nobody had any reasonable way of ascertaining where they were and they had not been taken care of.

Third, no such buildings should ever be left without a regular patrol of men skilled in fire prevention to the extent that they will recognize probable causes of danger and by means of official reports bring them to the attention of those who with a report on file, would hardly dare to neglect them. Such a system is now in force at the Hoosac and Mystic properties of the Boston & Maine above alluded to, and has been of the greatest advantage.

Boston Board of Fire Underwriters,
Inspection Department.

CHELSEA CONFLAGRATION.

(Second or Smaller Fire.)

September 21, 1908.

Fire was discovered about 7.45 this morning at the Atwood McManus Mfg. Company's plant, burning underneath or near the bottom on outside of the long frame lumber shed located along north side of Boston & Maine Railroad tracks.

Fire probably caused by sparks from passing locomotives. There were a number of freight cars filled with rags, on tracks near the shed where fire started.

Fire spread with great rapidity over the dry frame sheds and lumber. Watchman for the Pope & Cottle Co. (whose risk is located just west of Atwood, McManus and extending along railroad tracks as far as Third Street) also discovered fire burning at time when alarm was rung in and says at that time a light wind was blowing directly towards the Union Metal Works on north side of Carter Street and the office at this risk caught fire almost immediately; also the Pope & Cottle risk was soon ablaze. Then, in perhaps five minutes, wind suddenly shifted towards the east, spreading fire over entire Atwood, McManus risk and the Lee Shoe Shop located east of latter. The buildings of all these risks were of frame construction and the yards filled with lumber piles making an immense pile of wood for fire to feed on.

It is apparent that firemen were very slow in getting water onto fire or it could never have gained such headway. Inspector was told by man who claims to have been there when alarm was given that fire

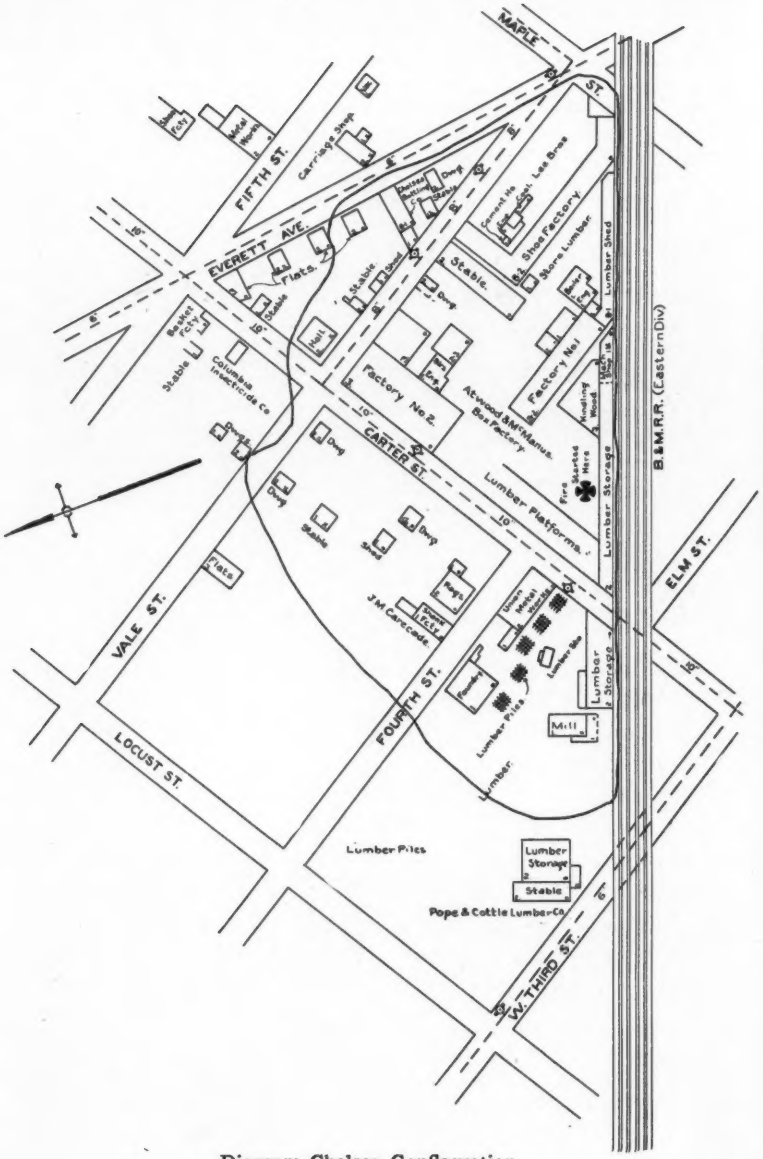


Diagram Chelsea Conflagration.

(Second or Smaller Fire.)

Looking West From Everett Avenue.

department responded quickly and attached engine to hydrant in Carter Street near risk and that fire spread so rapidly that they were unable to stay in this location, so before any water was obtained they had to move to another hydrant and on account of intense heat, horses could not be brought back and steamer was pulled by hand to this second hydrant on Carter Street near Vale Street. This was slow work and this man states that it was probably 25 to 30 minutes after fire was discovered before a stream was put on; very soon this engine had to be abandoned and left to be destroyed.

A general alarm was sent in very soon after the first alarm and help came from Boston, Everett and Revere, but by this time fire was a raging furnace and nothing could be done to save any of these manufacturing risks. About 10 o'clock fire was practically under control.

Loss is estimated at from $300,000 to $500,000.

NEW ORLEANS CONFLAGRATION.

August 30, 1908.

Remarks on Construction. The greater portions of the buildings have been in existence for a number of years and were essentially of an old type of construction. Nearly all walls were "party" walls and the thickness in practically every instance was less than standard. The stairs and elevators were generally without traps and the side and rear wall openings were largely without protection, and in those

instances where coverings had been installed on the openings none were of standard construction. The communications between adjoining buildings were not excessive, but in no case were the openings properly protected. The heights of the buildings varied from one to six stories. The construction was practically all joisted and in a number of instances it was found that where the joists had burned out of the walls, "through openings" were made, showing that joists from opposite side of a party wall had not been staggered. The roofs were generally of slate. The buildings faced streets varying in width from 38 to 47 feet and there was a court about in the center of the block having dimensions of about 50x80 feet. A number of the buildings had frame sheds, passages or galleries in the rear and in a number of cases these extended to exposing buildings. Practically all columns inside of buildings were cast-iron. The internal exposure in the block was considered as being particularly severe, and as a whole the block was considered as having one of the most pronounced conflagration hazards in the congested value district.

Fire Started at Nos. 518 to 534 Bienville Street. First and third stories occupied for a general glass business, including plate grinding, polishing and silvering. Electric power. Heat for silvering table from upright boiler in shed in rear of building. Second story occupied by Picard, Kaiser & Co. as a pants factory, electric power, and H. B. Stevens Co. as a tailoring establishment.

Remarks on Occupancy. The buildings involved contained a varied class of occupancies, and with one or two exceptions the stocks carried were very susceptible to both water and fire damage. It will also be noted that there was considerable light manufacturing, using electricity for power. The manufacture was confined principally to clothing, pants and overalls and the special hazards inherent to this class were, as a rule, well guarded.

Prevailing Direction and Maximum Velocity of the Wind. The highest velocity of the wind at any time during the fire was 12 miles per hour, which velocity obtained at 4 p. m., and the minimum velocity was four miles per hour, which prevailed from 7 to 7.30 p. m. This would give an approximate average velocity during the period of 6.8 miles per hour.

The above figures show there was at no time during the period a strong wind blowing, and while it is realized a fire of this magnitude and fierceness creates air currents, the fact remains that the entire fire zone was within 1,000 feet of the instruments of the Weather Bureau Observatory, the nearest point of the fire being but about 400 feet from same.

During the entire time of the fire the wind held from the east and northeast, making but three changes during the period and holding from the east about 65 per cent. of the time.

This Fire Was of Incendiary Origin—During the progress of the fire fire marshal started an investigation as to the cause of the fire. This investigation was continued through the succeeding days and pushed with the greatest energy and vigor, every clue being followed with the result that when the Grand Jury convened on September 8, the case

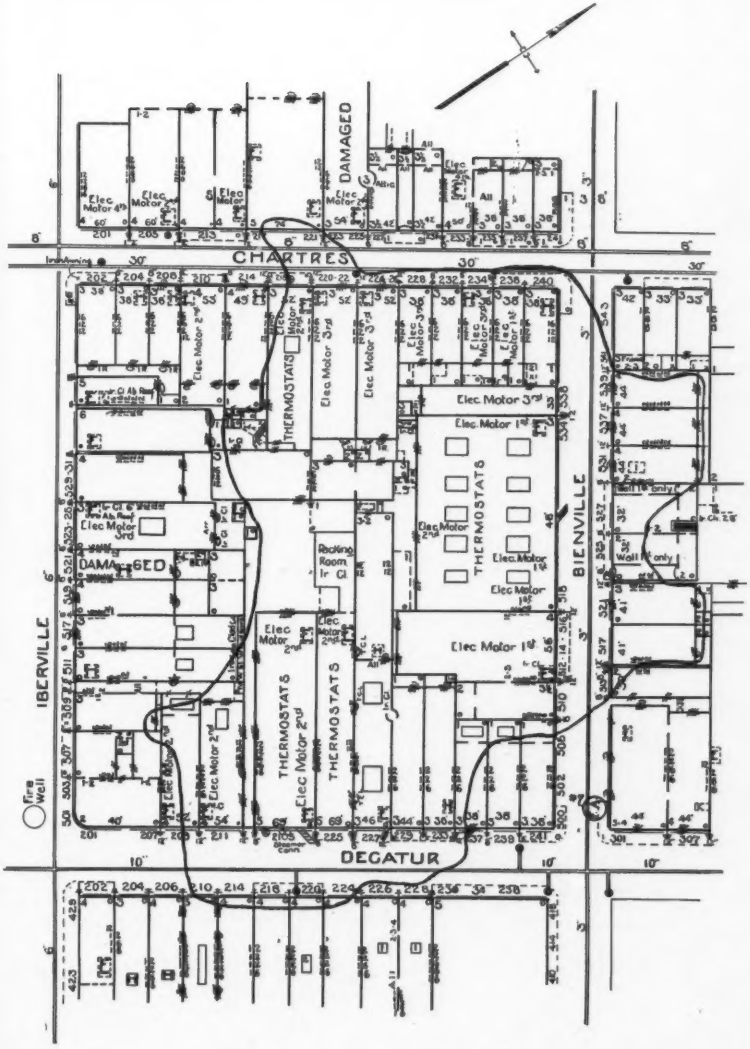


Diagram New Orleans Conflagration.

was submitted to that body and indictments returned against the vice-president, manager and one employee of the glass company, the latter as the confessed principal and the other two as accessories before the act. Great credit is due the fire marshal and his assistants for the work they have done and the manner in which they have handled this case.

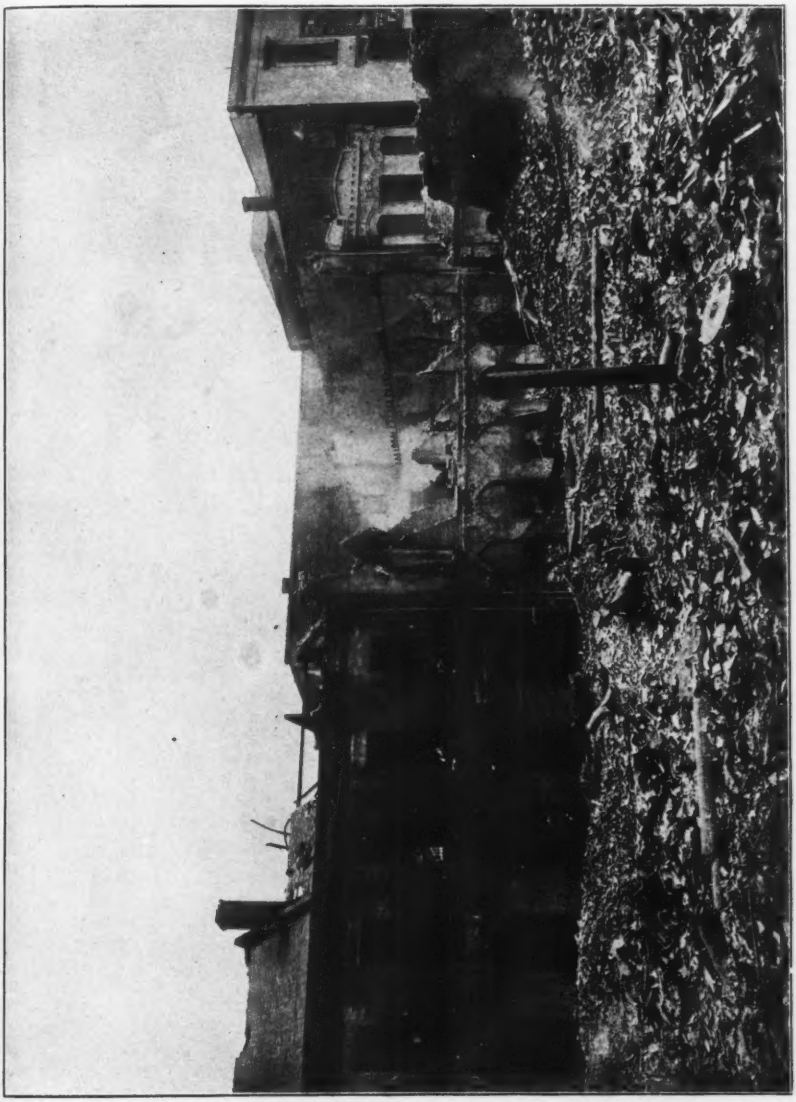
Fire Alarm. The Boylan officer on duty at this locality at time of fire claims to have discovered smoke issuing from the building at 518 to 534 Bienville Street at about 2.40 p. m., and immediately tried to send in alarm from public box No. 7, but states he could not get his key in the door. He states that he tried a second time and finding he could not open the box, proceeded to N. D. T. box 267 and sent in a fire alarm. At 2.45 p. m. the Western Union received a signal of three impressions from box 267, which signal was neither a police assistance call nor a fire alarm signal. The Boylan office was called up by telephone and they claim to have started an officer to the box to ascertain the trouble. At 2.47 p. m. the Western Union received from this same box three watchman's signals. The Western Union telephoned the Boylan office and offered the suggestion that the officer was trying to send in a fire alarm signal.

At 2.43 p. m. alarm from public box No. 7 came into the fire alarm office, it afterwards being ascertained that the box cover had been broken open. Almost simultaneously with box No. 7, signals from boxes 12 and 26 were received at fire alarm office, but were not sent out as alarm from box No. 7 was being sent out. At 2.44 p. m. signal 1022 was received from the National Automatic Fire Alarm Co., which, when compared with the chart, showed that it was for the same fire which box No. 7 was being sent out.

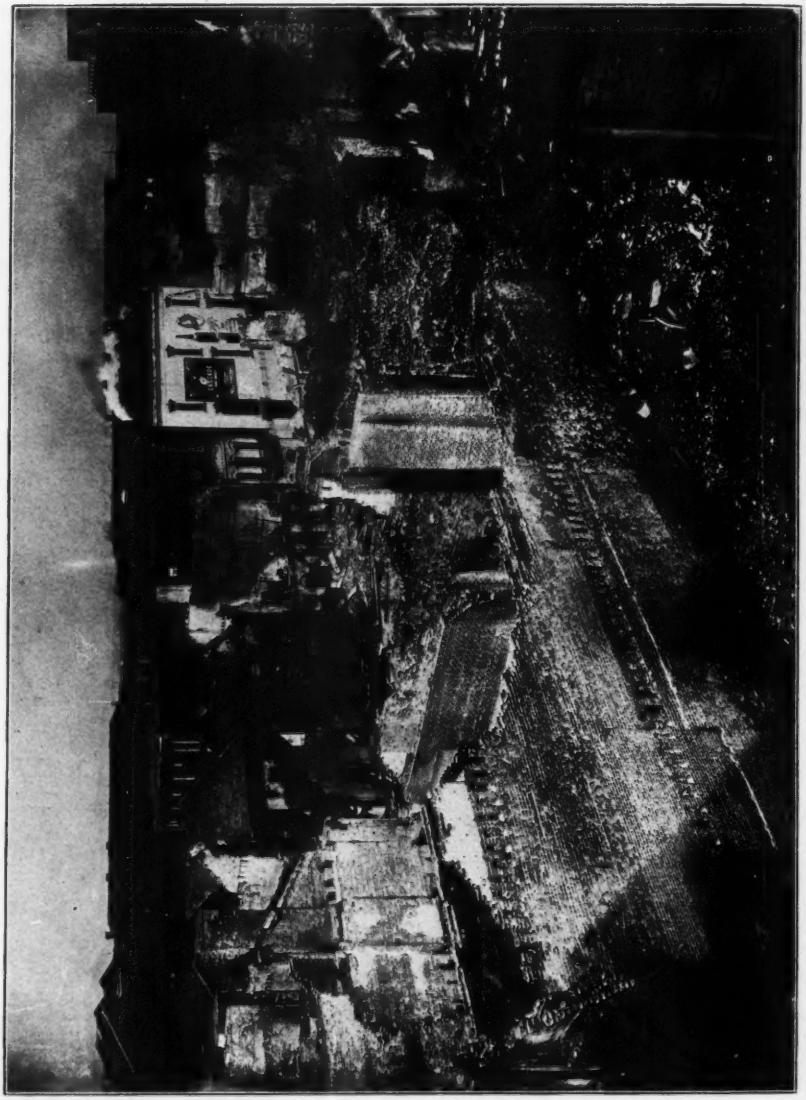
At 2.41 p. m. the National Automatic Fire Alarm Co. received at its central station a trouble signal from the equipment in building No. 518 to 534 Bienville Street, followed at 2.45 p. m. by a fire signal, which was transmitted to fire alarm headquarters as signal 1022, above referred to, and at 2.45½ a battery signal indicating that the batteries were out of commission. At 2.53 p. m. they also received a battery signal from the equipment in building No. 215 Decatur Street. No other trouble, fire or battery signals were received from any of the automatic equipments.

At fire alarm headquarters a repeated general alarm (three fours) from box 12 was received and sent out at 2.50 p. m., and at 3.30 p. m. a signal from box 12 was again received and sent out.

Progress of Fire. This fire was started at Nos. 518 to 534 Bienville Street, and immediately spread throughout this building and at once entered the building No. 538 Bienville Street, as well as igniting the fronts of buildings Nos. 525 to 531 inclusive on the opposite side of Bienville Street. The fire spread through the rear of Nos. 518 to 534 Bienville Street to the rear of Nos. 224-226 Chartres Street, and then communicated to Nos. 220-222 and 218 Chartres Street and the buildings in rear of same. After this the fire seemed to spread in all directions, entering the rear of building No. 512 to 516 Bienville Street and also the rear of building No. 215 Decatur Street, after which it



This shows the damage to building No. 525 and 527 Bienville Street, which was probably the oldest building involved and which was apparently the least damaged of any of the buildings in which fire actually occurred. Nos. 517 and 521 Bienville Street are shown completely wrecked. In the foreground is shown the complete wreck of No. 518 to 534 Bienville Street and illustrates very forcibly the effect of a fire on cast-iron columns which were a complete failure. The wall at the right is what was left of the division wall between No. 516 and 518.



This plate illustrates the failure of walls and the complete destruction of the buildings involved. A large number of the joist holes shown are "through openings."

entered buildings Nos. 225, 227, 211, 229 and 233 Decatur Street, and at the same time the fire on Chartres Street side of block extended to Nos. 228, 232, 234, 238 and 240, respectively, while buildings Nos. 517 and 521 also 537 and 539 Bienville Street became involved. At different periods during the fire buildings Nos. 223 and 225 Chartres Street and 509 and 521 Iberville Street were all set on fire on the roof by sparks and burning embers from the main fire.

From a careful study of plan which shows the rear and side wall openings, it will be noted that the conditions existing were extremely favorable to the spread of fire from building to building through these openings.

The court in the center of the main block involved undoubtedly kept the fire from spreading to the buildings fronting on Iberville Street, as this court prevented the buildings when the walls fell from crushing into the rear of the buildings on the opposite side of court.

It can safely be said that this fire communicated from one building to another entirely through unprotected wall openings except in cases where the walls fell and wrecked adjoining buildings, allowing free entrance for the flames.

Water Supply. There was no recording gage near the fire district and no record of the pressures near the fire is obtainable. Under ordinary service conditions, however, with 35 to 38 pounds pressure at the pumping station the pressure at waterworks office about three blocks from fire shows from 29 to 32 pounds.

It is not considered that water conditions were any worse than is usual, as the pressure was maintained, and with the pumps running as stated above a better supply than usual should have been available owing to the fact that there is less consumption on Sundays than on other days.

The fact is recognized that the street mains have been in service in this district for a number of years and it is probable that with the continued flow of the muddy river water the pipes are badly choked with mud and sediment and their efficiency for furnishing volume greatly reduced.

Fire Apparatus. Practically the entire fire department apparatus was used at this fire, there being 24 engine companies present out of a total of 27 companies, five hook and ladder trucks out of a total of eight companies, and seven chemical engines out of a total of 13 companies. In addition to this the department has a water tower and one independent hose company in the sixth district.

General Remarks. There was a delay of about three minutes in sending in an alarm after the discovery of the fire.

The first stream of water to be put into operation was brought into Bienville Street from Decatur Street and water appeared at 2.56 p. m., 13 minutes after the alarm and 16 minutes after the discovery of the fire.

This appears to be an inexcusable delay, as with comparatively short runs for the department and no heavy traffic on the streets at the time water should have been on this fire some minutes earlier. It should not be understood from the fact that a stream of water was in

operation 13 minutes after the alarm that it was at all effective, as it was some minutes afterwards before this first stream was sufficient in volume and pressure to reach the building in which the fire was confined at this time.

Before the department arrived the building No. 518 to 534 Bienville Street was on fire in all portions, with the flames extending so far into Bienville Street that the fronts of the buildings on the opposite side of the street were smoking and the woodwork in some cases igniting.

It is believed that with proper attention the buildings on the east side of Bienville Street could have been saved with practically no damage.

During the progress of this fire the shutters on several buildings fronting on Chartres Street were closed and the fire was kept from entering the buildings.

There would appear to be little excuse for the burning of the buildings Nos. 215 and 211 Decatur Street, as with the open court in rear of former building a good stand could be made against the fire in the one-story warehouses in rear of Nos. 225 and 227 Decatur Street. Two lines of hose were run into this court and while the window frames in rear wall of No. 215 were on fire in the upper stories and could have been extinguished with a chemical, the streams from the two lines referred to were not strong enough to reach the upper stories, but were directed against the rear of No. 215, where they were absolutely no use, instead of being directed on the one-story warehouses where they would have been of great value, and it is believed would have kept this fire down to such an extent that it would not have involved Nos. 215 and 211.

The water tower could have been used to excellent advantage at this fire, and while it was brought out shortly after four o'clock it was not put into service.

The American Sugar Refinery, located from one to two blocks distant, used their entire pump capacity for flooding gutters leading to the fire, and two steamers secured an abundant supply of water from this source.

During the entire duration of the fire, the police department rendered valuable service in keeping the streets open, immediately around the fire, which gave the fire department opportunity to work without interference.

Conclusions.

First—That the construction of the buildings involved was largely responsible for the spread of fire.

The construction of the buildings in the block was very inferior, practically all of the walls being "party walls" and a number of them were less than standard thickness. The floor openings were as a rule unstopped and the openings in rear and side walls generally unprotected, and where protection was provided for these openings the doors and shutters were sub-standard. An extremely poor grade of brick and mortar was found in a number of cases, causing a complete wall failure, and interior cast-iron columns failed in every case.

Second—That the wind had no effect on the spread of fire.

At no time during the progress of the fire did the wind exceed a velocity of 12 miles per hour, which velocity was reached about one and one-quarter hours after discovery of fire and from this time the velocity gradually decreased to four and five miles per hour.

Third—That the delay in turning in an alarm for this fire was without excuse and entirely unwarranted.

There was a delay of three minutes in turning in an alarm after discovery of fire, which was inexcusable. The Boylan officer, whether from his excitement or otherwise, found he could not open box with his key. He should have broken the box door and turned in the alarm, as was afterwards done by other parties. This delay would have been avoided had fire alarm boxes been of the keyless type.

Fourth—That the damage caused by this fire was unwarranted.

It is confidently believed that with judicious handling of the apparatus at this fire at least some of the buildings which were involved could have been saved with practically no damage.

Fifth—That the water supply was deficient.

The New Orleans Water Works Co. appear to have more than fulfilled their contract with the city during all stages of the fire, but the waterworks system of this company was outgrown years ago, and was entirely inadequate to cope with a fire of this magnitude.

Sixth—That an independent high pressure waterworks system for fire purposes only should be installed at once in the congested value district.

With the conflagration hazard existing in this city, where entire blocks of mercantile buildings of poor construction are not only subject but liable to one quick fire, the need of a special waterworks system to cope with this situation is undeniable.

Seventh—That fire wells of ample capacity should be placed at each street intersecting throughout the congested value district.

There were insufficient hydrants within working distance to accommodate the number of engines necessary to extinguish this fire, and had it not been for the few fire wells available, where engines could be "parked" and secure a supply of water, some of the engines would have had to "relay" others connected to distant hydrants.

Eighth—That the fire fighting equipment of New Orleans is entirely inadequate.

Practically the entire fire department and apparatus was concentrated around one city block for a period of about seven hours, leaving the entire city, covering an area about 400 square miles, part of which is across the river, practically without protection, the three steamer companies not doing duty at the fire being poorly distributed.

Ninth—That no shingle or board roof should be permitted on any building inside the corporate limits.

It is believed that New Orleans was saved from a catastrophe by the great proportion of slate and metal roofs existing. Burning sparks and embers ignited rubbish and debris in several places, and charred embers were noted to fall as far away as Audubon Park.

Tenth—That statements with reference to firemen being off duty were unfounded.

From the records of the fire department it was ascertained that there were more men actually on duty at the fire than would have been on duty any other Sunday this summer. This should not be taken to mean, however, that the men were at quarters ready to respond to an alarm, as 35 men were ordered in from the festival to do duty. Neither should it be inferred that the fire department has a full complement of men. The facts are that the department is much undermanned.

Eleventh—That the steam fire engines did not furnish the efficiency to be expected.

At the time the pressures were taken, eight of the 16 steamers in operation showed a pressure of 100 pounds or more, and eight less than 100 pounds. Besides, a large number of these steamers are too small for the needs of this department.

Twelfth—That the supply of hose for the fire department is entirely inadequate and the value of a large amount of that on hand is questionable.

It will be noted from this report that some steamer companies had to take all the hose of other companies in order to get water from their steamer to the fire, also that the Sixth District hose wagon has no hose. It is also noted that a number of lengths of hose burst during the fire. It is a fact that this department is in a deplorable condition with reference to hose. Practically no company has a duplicate supply of hose and no proper means are provided at company quarters for drying hose, which, as consequence, necessitates washing the mud off and reeling it up wet in order to be ready to respond to an alarm. Hose cannot be expected to last under these conditions.

Thirteenth—That the incompetency and inefficiency of the fire department was again demonstrated.

The water tower, the most valuable piece of apparatus in the department, was not brought till an hour and 25 minutes after the alarm and then was not put in use. The department practically fought this fire from the sidewalk with inefficient hose streams, which could have been carried into buildings and used to better advantage. Outside standpipes on fire escapes which could have been used to advantage were ignored. There was a delay in getting the apparatus to working and water on the fire. Buildings were allowed to be totally destroyed which should not have been involved.

Fourteenth—That public alleys through congested blocks and courts in interior of blocks are of undeniable value.

The narrow private alley and the small court in this block proved an excellent point of vantage from which to fight this fire, but unfortunately was not judiciously used. By the use of alleys and courts untold water damage caused by carrying lines of hose through buildings would be eliminated.

Louisiana Fire Prevention Bureau,
MORRIS D. PIERCE, *Engineer.*

MISCELLANEOUS FIRE RECORD.

H-3196. Birmingham, Ala. June 26, 1908. Ice Factory.

Story of Fire. At about 3 a. m. on date above mentioned, the inlet valve on the large 70-ton compressor machine became loose from supports and fell into the cylinder of machine; and with the following return motion of the piston the cylinder head was broken, allowing gases from system to escape into building. The valve controlling discharge pipe from compressor to condenser system could not be closed by employees due to suffocating action of ammonia fumes. For about five minutes the blast of gases continued or until the system was nearly exhausted, at about which time fire developed in gases in roof above compressor machine, apparently spontaneously.

The alarm of fire was promptly transmitted to fire department headquarters, and companies arrived shortly. From information available the firemen did excellent work in practically confining fire to building in which it originated.

Cause of Fire. Attention is first called to the large quantity of gases discharged from the broken compressor into the building. Just before the inlet valve of the machine broke, compressor was operating under about 200 pounds pressure (compressor end), and after the accident the blast of gases resulting lasted about five minutes.

As to the nature of the gases evolved, of course the chief one was anhydrous ammonia, however steam vapor was emitted from the jacketed cylinder of compressor, and due to no check valve being located in discharge pipe from compressor, there is no doubt but that a large quantity of mineral oil (from oil traps) and also foreign oils and gases in condenser (the usual deposit from commercial ammonia) was evolved from compressor and mixed with ammonia fumes.

Again, consideration must be given to the temperature of heat of compression. The temperature of water in water jacket surrounding cylinder usually registered as high as 200 degrees F.; thus it may be reckoned that the temperature of at least a part of the gases evolving was considerable.

As best it can be judged there were three possible causes for the development of this fire:

First—When anhydrous ammonia comes in contact with water vapor a reaction takes place in which ammonium hydroxide, or hydrate, is formed; necessarily, it is believed considerable heat would be involved in the reaction, and it may be that a sufficient temperature was reached to cause an ignition of the atomized mineral oil and foreign oils or gases (deposited in condenser) which were mixed with gases evolved. It must be remembered that the gases issuing from compressor were already in a partly heated state, which might have accelerated the speed of reaction above mentioned.

Second—It is possible that the wiring of the building, in part, may not have been in good repair (for instance the insulation may have been worn on flexible cords). Now a spark might have been induced through the partly conducting medium of the surrounding gases which might have ignited the inflammable gases existing in mixture of the blast.

Third—A spark might have been produced in cylinder of compressor caused by abrasion of piston with broken metal parts, which could have ignited the gases in question. From information available the machine continued in operation for a while after the accident occurred.

Remarks. This fire presents a most extraordinary case, it being particularly singular in that assured has had similar accidents before with evolution of gases following, but no fire resulting. The oil used in the compressor was a West Virginia petroleum oil. A sample of this oil was obtained and flash and burning point tests made, with result that oil was found to have the very low flashing point of 244 degrees F. and 286 degrees F. burning point. The ammonia used in process was obtained from the National Ammonia Company, of St. Louis, Mo. From information available upon the development of the fire, the flames presented a bright golden color; now, when ammonia is burned (Note—Ammonia gas is not inflammable; but if heat is applied sufficient to cause its decomposition, the hydrogen presented would ignite in case of enough oxygen present to support combustion) a pale yellow light is emitted. Thus it may be reckoned that this ammonia color was adulterated by the burning oils in mixture.

The assured has rebuilt the burned portion of plant of practically similar construction as before and the machinery and fixtures are being repaired. For the prevention of another fire owing to a possible similar accident in the future, the following improvements are suggested:

First—All discharge pipes from compressor machines should be provided with check valves. These valves would automatically prevent a back flow of contents from condensers in case of accident to compressor.

Second—It is suggested that a steel frame, metal-clad monitor ventilator be provided over all compressor machines in plant. These would serve in a measure to effect the liberation of any blast of gases from building in case of accident.

Third—All electric wiring in the building should be in strict conformity to the National Electric Code, and it is advised that only weather-proof sockets be used and that all flexible cords at present in use be replaced by the reinforced cord.

Fourth—It is advised that the mineral oil at present in use for lubrication purposes in machines be thoroughly investigated, and if practicable be substituted by some oil that has a flash point of not less than 356 degrees F. (open test).

S-7783. Boston, Mass. July 16, 1908. Dock Storehouses. Two boxes of "detonating corks" were being examined by customs officers, when they exploded, killing three men and a horse and injuring three other men seriously. Damage to building about $500, from explosion, but no fire. Damage to stock by fire and water may reach $1,000.

There were two cases of explosives. The cases were ordinary wooden boxes about two feet square, bound on edges with metal strips. They came from the interior of Germany and were shipped from Hamburg. The goods arrived in Boston over two weeks ago.

They were invoiced as "Detonating Corks" and were shipped subject to order.

Stone & Downer, custom house brokers of Boston, received an order from their Chicago agents to receive the goods on the arrival of the steamer. They did so and the Chicago house asked that they be forwarded to that city in bond. Before Stone & Downer could comply with this request, the order was countermanded by a statement that the goods were very dangerous and that the firm about to receive them had decided to abandon them. Stone & Downer immediately sent a man to the docks, who notified the B. & M. representatives and the customs officers of the dangerous character of the goods. This man also painted in large black letters the words "Fireworks, Handle With Care" on each box. He states that the only other unusual mark on the boxes when he painted them was a red label bearing the word "Poison" done in black letters with a hand brush. Stone & Downer at that time notified the custom house officers that the goods were abandoned. This was two or three days ago. The officers sent an examiner and an "opener and packer" to look at the goods today in order to ascertain their character and value, that they might be listed, with other abandoned goods, for public auction. Meanwhile the goods had been carefully cared for on the dock. They were kept in a small room in the west end of building, which room is in charge of the customs officer.

The customs officer and his helper entered the small room containing the explosives, and began work opening the cases. The room was about 10x12x7 feet, built of single boards on joists. Its ceiling was about 20 feet below the main roof. There were sprinklers inside the room and under the main roof above. The officials were accompanied by the watchman of the building. It is said that the helper had a hammer and a box chisel and that one case had been opened before the explosion took place. This story cannot be wholly verified, but it is likely that the explosion resulted from the renailing up of one of the cases. The explosion was very severe, killing the men, injuring others and completely demolishing the nearby woodwork. The explosion showed the characteristics of dynamite, as its greatest force was evidently downward. A clean hole about three feet by five was made through the floor which was of four inch planks. These planks as well as 4x6" sticks are torn short off. No traces of the boxes except some splinters can be found. Two 1¼ inch sprinkler pipes were torn open, causing the dry pipe valve to trip and allowing water to discharge on the debris.

The private fire department deserves great credit. Although the conditions must have been very demoralizing, the employees in the building quickly got out lines of hose and attacked the fire with the result that few signs of fire are now visible. Three streams were taken from the yard hydrant and two from standpipes inside the building. The public fire department was called, but on their arrival the fire had been put out, this also without a sprinkler having opened by the heat.

The "Detonators" are ordinary bottle corks about ¾ inch long by ⅝ diameter with a hole dug out the small end about ¼ inch deep

into which, evidently, the explosive had been put. Probably the corks were used simply as cushions in which to mount the pieces of explosive material. Many remains of these are scattered about. We cannot describe their form before they were exploded, nor the manner in which they were packed.

Messrs. Wm. Read & Son of Boston, who have handled explosives for over 20 years, state that they have never seen such a device nor can they imagine for what it could be used. Masten & Wells, experienced fireworks manufacturers, state that they never heard of such devices in connection with their business. The devices must have been rather crudely made or possibly the use of the corks was simply a means for packing the explosive.

The responsibility of the explosion lies with the custom house workmen, who are dead. The careless use of tools or handling the explosives undoubtedly caused the explosion. The men had been warned of the character of the goods. There were electric wires in the room, but there is no evidence that they caused the explosion.

The fact that these boxes had been shipped mislabelled with the evident intention of deception regarding their contents cannot be overlooked. This deception is criminal and the perpetrators responsible cannot be condemned too strongly. Those responsible for fire on the docks could not be expected to recognize these mismarked packages as being hazardous.

Notes and Tables.

CLEVELAND CITY ORDINANCE PROHIBITING THE SALE OR USE OF FIREWORKS, TOY BALLOONS OR PYROTECHNIC DISPLAYS.

Your attention is invited to an ordinance, passed by the Cleveland City Council, on the 13th inst. prohibiting the sale or handling of fireworks or toy balloons within the limits of the City of Cleveland, the full text of said ordinance being as follows, viz.:—

"Section 1 (1557-a). That no person, firm or corporation shall within the city, sell, offer for sale or have in his or its possession or custody any toy pistol, squib, rocket, cracker, roman candle or fire balloon or other combustibles, fireworks or any article for the making of a pyrotechnic display, provided that nothing in this section contained shall be construed as to prohibit the board of public service from giving pyrotechnic displays of fireworks in the public parks whenever said board is thereunto directed by resolution of this council.

Section 2 (1560-). That any person violating any of the provisions of sections 1557, 1557-a or 1558 shall on conviction thereof be fined in any sum not exceeding $100 or imprisoned in the workhouse not exceeding thirty days or both at the discretion of the court.

Section 3. That sections 1559 and 1560 of the revised ordinances be and the same are hereby repealed.

Section 4. This ordinance shall take effect and be in force from and after its passage and legal publication."

This ordinance was prompted as a result of a horrible occurrence on July 3 last, in a Racket Store at No. 2025 Ontario Street. A clerk was demonstrating a "harmless sparkler," when, in some manner, fire communicated to an open display of fireworks at hand, resulting in the death of seven persons, injuring a score or more, and burning out the building. Within the past year a wholesale dealer in fireworks on Water Street, this city, experienced a fire of this nature, injuring several people, and gutting the building. A few years ago, a dealer in fireworks having an open display stand in a street of this city, in some manner set fire to his stock, and endangered the lives of people on the street.

These incidents and the usual number of deaths, accidents and fires occurring during the celebration of July Fourth, aroused the citizens to a point to influence a halt to the annual slaughter and destruction caused by fireworks, the ordinance in question being the outcome.

This Bureau strongly endorses and approves the wise action taken by the City Council: It would be well were similar action taken in other cities, and all possible pressure should be exercised to have this made a far-reaching measure.

As a further endorsement of this ordinance, and aid to prevent

its violation, this Bureau recommends that hereafter in granting permits for the handling or sale of fireworks in buildings within Cuyahoga County, that a permit be granted only in consideration of an additional premium of 50 cents per $100 per month, to apply to all insurance in force covering buildings, contents, rents, or use and occupancy of such premises.

Respectfully yours,

Cleveland Inspection Bureau,

C. H. PATTON, *Publisher.*

HANDLING OF LIVE WIRES AND FIRE STREAMS.

On August 17, 1908, a meeting was held at Altoona, Pa., which was attended by officials and employees of the Lines East and West of Pittsburgh to the number of about 200, at which instructions and demonstrations were given of (1) the method of, and the precautions to be exercised in, handling live wires, and (2) approved methods to be employed in resuscitation of those apparently dead from electric shock. In addition a series of tests was run to determine, for various voltages, the distance from live wires at which streams from fire hose and chemical extinguishers might be played on the same without injury to those handling the hose.

By reason of the increasing use of electricity along the lines of the Pennsylvania Railroad Company, it has become of great importance that employees have a better understanding of the personal hazard involved in the handling of live wires so that the rescue and resuscitation of those suffering or who have suffered electric shock may not be delayed through ignorance or misconception. Lectures to employees on approved methods of resuscitation of those apparently dead from electric shock have been given in the past from time to time, by the Relief Department, as a part of First Aid instruction. At such times brief instructions have been given on the recovery of bodies in contact with electric wires. It was decided, however, to go into more detail in this direction at the present time, before representatives of the various divisions so that such representatives might in turn disseminate the information gained to employees under their charge.

A lecture and demonstrations on the methods to be used in resuscitation from electric shock was given in the forenoon on the above date by the local Medical Examiner, a summary of which is given in instructions on "Resuscitation from Apparent Death from Electric Shock," after which those present practised the movements on each other to a considerable extent. In the afternoon, demonstrations of the proper methods of handling wires and playing of fire streams were carried out, suitable wires and apparatus having previously been erected for this purpose in a convenient location in Altoona Yard.

Handling of Live Wires.

A pair of iron pliers, designed for use in cutting wires carrying high potential, was exhibited and the essential features demanded were carefully pointed out. These consisted mainly in the insulation on the

handles of the pliers, which is required so that no part of the hands or of the person manipulating them shall come in contact with any metal part of the pliers which in turn comes into contact with the wire in the act of cutting. The insulated handles were of wood and were screwed securely onto the metal handles of the pliers, after which they were boiled in paraffin. The insulation was tested at 8,000 volts alternating and successfully withstood this test. Equipped with these pliers, and standing upon a thin board, an operator cut several times a line which was lying on the ground carrying a potential of 2,300 volts—the other side of the wire being thoroughly grounded.

To illustrate methods which might be used to remove a wire from a body in the event of pliers or other means of cutting the wire not being at hand a coat was placed under the wire and held at either side by means of the sleeves; two persons are necessary for this maneuver. By this method the wire was raised from the ground, no effect being felt by the persons holding the coat, though the latter was somewhat damp. The live wire was further handled and carried about by means of a hook, having a handle several feet long. In all cases the other side of the wire was grounded.

Experiments With Fire Streams.

In order to determine definitely what hazard, if any, existed for firemen when they were compelled in line of duty to play water from fire streams on live wires at various potentials, arrangements were made so that circuits of 525, 2,300 and 4,600 volts respectively were available. The 525 volt line was a direct current trolley wire connected to the trolley of the Altoona & Logan Valley Electric Railway Company. The 2,300 volt and 4,600 volt lines were fed from alternating current generators at Altoona Car Shops. One side of each of these circuits was thoroughly grounded and the fire stream played on the other side which was suspended in the air and thoroughly insulated. A suitable voltmeter was connected between the nozzle and ground to enable the difference of potential between the nozzle and ground to be noted in each case. The following results were obtained, at the voltages specified below, in tests made the day previous to the general demonstration:

525 Volt Trolley Wire.
⅝ in. Nozzle.

Distance of Nozzle from Wire.	Potential between Nozzle and Ground.
7 ft. 5 in.	20 volts.
4 ft. 9 in.	38 volts.
3 ft. 7½ in.	60 volts.
2 ft. 2 in.	70 volts.
0 ft. 7½ in.	210 volts.

These results show that the nozzle may be handled without discomfort up to a point between three and four feet from the wire when those holding the nozzle are standing on the ground. It may be car-

ried much nearer without harm but would probably cause some discomfort. If those holding the nozzle were standing on a ladder or were otherwise insulated from the ground it would be quite safe to bring the nozzle to within a few inches of the wire.

2,050 Volt Line.
⅝ in. Nozzle.

Distance of Nozzle from Wire.	Potential between Nozzle and Ground.
6 ft. 6½ in.	Static
3 ft. 5½ in.	Static

4,100 Volt Line.
⅝ in. Nozzle.

Distance of Nozzle from Wire.	Potential between Nozzle and Ground.
6 ft. 6½ in.	Static
3 ft. 5½ in.	Static

In each of the above tests no measurable deflection could be obtained on the voltmeter but upon touching the nozzle with the hand when standing on the ground a slight effect due to static electricity was noted.

The above results were obtained in tests conducted a day previous to the general demonstration. In the demonstration, however, results were obtained which agreed with these. These results follow:

525 Volt Trolley Wire.
⅝ in. Nozzle.

Distance of Nozzle from Wire.	Effect at Nozzle.
3 ft. 0 in.	Slight indication to hand.

2,300 Volt Wire.
1 in. Nozzle.

Distance of Nozzle from Wire.	Effect at Nozzle.
8 ft. 0 in.	Slight indication of static electricity to hand.

4,600 Volt Wire.
1 in. Nozzle.

Distance of Nozzle from Wire.	Effect at Nozzle.
10 ft. 0 in.	Slight indication of static electricity to hand.

In each case the nozzle was sufficiently near the wire so as to cause a solid stream to play on the latter. Just how far the results of a fire hose test with salt water will differ from those above, which were made with fresh water, cannot be said at the present time.

Experiments were also made with streams from hand chemical extinguishers and it was found that when a solid stream is played on a high potential wire it becomes a source of danger to one holding the extinguisher. For instance, the nozzle of an extinguisher was held at a distance of nine (9) inches on a grounded 2,050 volt alternating line.

The difference of potential between nozzle and ground was 1,500 volts when the extinguisher was insulated from the ground.

The Pennsylvania Railroad Co.,
R. H. NEWBERN, *Superintendent Insurance Department.*

CHLORATE EXPLOSIONS.

Regarding the recent explosion of potassium chlorate in the establishment of Sharp & Dohme, Baltimore, the firm makes the following statement, which, in view of the similarity to the Tarrant explosion, will be of interest to underwriters:

"As the matter is of importance to the many makers of chlorate tablets, we think it may serve a useful purpose to give the actual facts of the case. The chlorate was of the kind usually known as 'santonin crystals.' It was tested for purity before compressing and the quantity remaining was again tested and found to be faultless and quite clean. It was being compressed upon an ordinary rotary machine of a type which we have used for several years with perfectly satisfactory results, and similar to those which we have known to be used elsewhere for many years.

"The machine, after a thorough cleaning, had been working on this particular lot of chlorate for one whole day and for an hour and a half the next day, when a violent explosion occurred. The machine was wrecked and a portion of it unfortunately struck the attendant on the head, with fatal result. The attendant had been engaged upon the work for ten years, was a thoroughly reliable man, and understood the necessity of caution in handling chlorate. So far we have not been able by careful investigation to determine any reason for the explosion, nor to find that any conditions were different from those under which many hundreds of tons have been successfully handled."

"The Chemist and Druggist," of London, in its September 12 issue contains a report made by Major Cooper-Key, Chief Inspector of Explosives, on the explosions at the stores of Thompson, Son & Williams, Hulme, Manchester, England, recently. The inspector attributed the origin of the disaster to the presence of dust on the floor of the warehouse. It appears that the warehouse contained many tons of chlorate of sodium, chlorate of potassium and chlorate of barium, stored in barrels lined with paper, while in the adjoining yard there were 28 barrels of varnish. A laborer named Wood, in reaching a winch handle, jumped from a barrel and struck a spark with his boot, and then saw a flame. Rubbing the place with his foot only made the flame worse, and soon afterward three explosions occurred.

The chief inspector says he is of opinion that the fire was undoubtedly caused by the friction of Wood's boot on a mixture of chlorate of sodium or potassium and organic dust on the floor of the warehouse, the presence of this mixture being proved beyond question by the rapid spread of the flame when rubbed with the foot. In spite of the apparently dangerous properties possessed by chlorate, Major

Cooper-Key remarks this is the first recorded accident, other than those due to chlorate of potassium lozenges, that has occurred in England in connection with the storage of these salts since the St. Helens disaster in 1898.

After this second warning, however, Major Cooper-Key remarks that manufacturers and others will do well to consider whether it is not to their best interest to render the chance of accident yet more remote by adopting precautionary measures, such as:

1. The elimination, so far as may be possible, of combustible material in the packages containing chlorate.

2. The establishment of separate buildings, of fireproof construction, for the storage of chlorate.

3. Absolute cleanliness, i. e., the outside of the kegs, the floor and walls of the store should be kept clear of all dust and dirt, and no one should enter the building in his ordinary boots. Either these should be taken off or "overshoes" should be provided, as in a gunpowder magazine.